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Traffic Impact Study

Neon Marketplace

Convenience Store & Gas Station

75 Quinsigamond Avenue
Worcester, MA

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INTRODUCTION

McMahon Associates has completed a review of the existing traffic operations and potential traffic impacts associated with the proposed Neon Marketplace convenience store and gas station project at 75 Quinsigamond Avenue in Worcester, MA. The purpose of this traffic impact study is to evaluate existing and projected traffic operations and safety conditions associated with the proposed development within the study area.

The assessment documented in this traffic impact study is based on a review of existing traffic volumes, recent crash data, and the anticipated traffic generating characteristics of the proposed project. The study examines existing and projected traffic operations (both with and without the proposed development) at key intersections in the vicinity of the project site. The study area was selected based on a review of the surrounding roadway network and expected trip generating characteristics of the proposed project. This study provides a detailed analysis of traffic operations during the weekday morning and weekday afternoon peak hours, when the combination of adjacent roadway volumes and project trips is expected to be the greatest.

Based on the analysis presented in this study, the project-related traffic estimated to be generated by the proposed development would not have a significant effect on the safety and operations of the area roadways and intersections. The following report documents these findings.

Project Description

The proposed Neon Marketplace convenience store and gas station development would be located at 75 Quinsigamond Avenue in Worcester, MA. The site currently consists of an undeveloped lot, as shown in Figure 1. The site is bounded by Quinsigamond Avenue to the west, Millbury Street to the east, Arwick Avenue to the north, and Haddad Auto Detail to the south. The proposed project would include the construction of a 5,620 square-foot convenience store with a drive-through and eight gasoline pumps (16 fueling positions).

Access to the site would be provided via one right-in only driveway and one right-out only driveway on Quinsigamond Avenue, one full-access driveway on Arwick Avenue, and one full-access driveway on Millbury Street. As part of the currently proposed project, Arwick Avenue would be converted from a one-way eastbound roadway to a two-way roadway between Quinsigamond Avenue and Harding Street.

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Figure 1
Site Location Map
Convenience Store & Gas Station
Worcester, Massachusetts

Study Methodology

This traffic impact study evaluates existing and projected traffic operations within the study area for the weekday morning and weekday afternoon peak hour traffic conditions, when the combination of the adjacent roadway volumes and estimated project trips would be expected to be the greatest.

The study was conducted in three steps. The first step consisted of an inventory of existing traffic conditions within the project study area. As part of this inventory, manual turning movement counts were collected at key intersections during the weekday morning and afternoon peak periods. A field visit was also completed to document intersection and roadway geometries and available sight distances at the proposed site driveway locations. Crash data for the study area intersections was obtained from the Massachusetts Department of Transportation (MassDOT) to determine if the study area has any existing traffic safety deficiencies.

The second step of the study builds upon the data collected in the first step to establish the basis for evaluating potential transportation impacts associated with the projected future conditions. During this second step, the projected traffic demands associated with any planned future developments that could influence traffic volumes at the study area intersections were assessed. Consistent with MassDOT traffic study guidelines, 2021 Existing traffic volumes were forecasted to the future year 2028 to determine 2028 No Build (without project) conditions and 2028 Build (with project) conditions.

The third step of this study determined if measures were necessary to improve existing or future traffic operations and safety, minimize potential traffic impacts, and provide safe and efficient access to the proposed project site.

Study Area Intersections

Based on a review of the anticipated traffic generating characteristics of the proposed project and a review of the adjacent roadways serving the project site, the following study area intersections were selected for analysis:

- Quinsigamond Avenue at Millbury Street/Cambridge Street
- Quinsigamond Avenue at Arwick Avenue
- Quinsigamond Avenue at the proposed site driveways (2)
- Arwick Avenue at the proposed site driveway
- Millbury Street at the proposed site driveway/Haddad Auto Detail driveway

The traffic impact study presented in this report documents existing and future traffic conditions for the study area intersections noted above.

EXISTING CONDITIONS

An accurate assessment of the potential traffic impacts associated with the proposed Neon Marketplace convenience store and gas station development requires a comprehensive understanding of the existing traffic conditions within the project study area. The existing conditions assessment included in this study consists of an inventory of intersection and roadway geometries, an inventory of traffic control devices, the collection of peak period traffic volumes, and a review of recent crash data. The existing conditions in the vicinity of the project site are summarized below.

Roadway Network and Intersections

The project site benefits from excellent access via the local and regional roadway system. A brief description of the principal roadways providing access to the project site is presented below.

Quinsigamond Avenue

Quinsigamond Avenue runs in a general north-south direction through the City of Worcester from Southbridge Street in the north to Millbury Street/Cambridge Street in the south. South of Millbury Street/Cambridge Street, Quinsigamond Avenue becomes Route 146, a limited-access highway, and is under MassDOT jurisdiction. Quinsigamond Avenue, north of Millbury Street/Cambridge Street, is classified as an urban principal arterial under City of Worcester jurisdiction. In the vicinity of the project site, Quinsigamond Avenue provides two approximately twelve-foot travel lanes in each direction, with two-foot shoulders on each side of the roadway. Sidewalks are provided on both sides of the roadway for the length of Quinsigamond Avenue. No speed limits are posted on Quinsigamond Avenue in close proximity to the project site. Therefore, the statutory speed limit of 30 miles per hour (mph) in thickly settled areas is expected to apply.

Arwick Avenue

Arwick Avenue is a local road which runs in an east-west direction between Quinsigamond Avenue and Millbury Street. Arwick Avenue is primarily one-way, providing a single eastbound travel lane between Quinsigamond Avenue and Harding Street, where it connects to the roundabout at Millbury Street via a short segment of two-way operations. Sidewalks are provided on both sides of the roadway, and no speed limit is posted. No parking signs are located on both sides of Arwick Avenue.

Millbury Street

In the immediate vicinity of the project site, Millbury Street is a local road under City of Worcester jurisdiction which provides two-way travel in a general north-south direction. To the north of Arwick Avenue, Millbury Street provides a single southbound travel lane, and to the north of Ashmont Avenue, Millbury Street is classified as an urban minor arterial. Near the site, Millbury Street provides one approximately eleven-foot travel lane in each

direction, with five-foot shoulders and sidewalks provided on both sides of the roadway. No speed limits are posted on Millbury Street, so the statutory speed limit of 30 miles per hour (mph) in thickly settled areas is expected to apply.

Cambridge Street

Cambridge Street generally runs in an east-west direction through the City of Worcester and is classified as an urban principal arterial under City of Worcester jurisdiction. Cambridge Street generally provides one travel lane in each direction with sidewalks provided on both sides of the roadway. At its intersection with Quinsigamond Avenue, a shared left-turn/through lane and a dedicated right-turn lane are provided on Cambridge Street.

Existing Traffic Volumes

Existing Peak Hour Traffic Volumes

To assess peak hour traffic conditions, manual turning movement counts were conducted at the study area intersections during the weekday morning and weekday afternoon peak periods.

Counts were conducted at the existing study area intersections on Thursday, April 8, 2021 from 7:00 AM to 9:00 AM and from 4:00 PM to 6:00 PM. The results of the turning movement counts were combined and tabulated by 15-minute periods and are provided in Appendix A of this report. The four highest consecutive 15-minute intervals during each of these count periods constitute the peak hours that are the basis of the traffic analysis provided in this report. Based on a review of the peak period traffic data, the weekday morning peak hour at the study area intersections occurs between 7:45 AM and 8:45 AM, and the weekday afternoon peak hour occurs between 4:15 PM and 5:15 PM.

COVID-19 Adjustment

The COVID-19 pandemic has resulted in changes in roadway traffic volumes relative to recent prior years. In order to assess the potential impacts of the COVID-19 pandemic on the turning movement counts conducted, historic traffic volumes for the intersection of Quinsigamond Avenue at Millbury Street/Cambridge Street were acquired from the Draft Environment Impact Report (DEIR) prepared for the Polar Park baseball stadium, dated April 2019.

The traffic volumes reported in the Polar Park DEIR are seasonally-adjusted vehicle volumes during the weekday morning and weekday afternoon peak hours, based on turning movement counts conducted on Thursday, March 7, 2019. A review of the March 2019 data and the April 2021 data indicates that the peak hour volumes under the 2019 conditions were approximately 20% higher during the weekday morning peak hour and approximately 5% higher during the weekday afternoon peak hour. These adjustments are shown in the traffic projection model presented in Appendix B of this report.

Polar Park Vehicle Trips

Between the April 2019 turning movement counts and the development of the 2021 Existing conditions utilized in this report, the Worcester Red Sox minor league baseball team began playing games at the newly-constructed Polar Park, a 9,500-seat stadium located approximately 0.7 miles to the north of the project site. In order to account for the potential impacts of vehicle trips to and from Polar Park, weekday morning and afternoon peak hour vehicle trip estimates contained within the April 2019 DEIR prepared for the park were added to the 2021 Existing condition volumes. The DEIR reported estimated additional vehicle trips at the intersection of Quinsigamond Avenue at Millbury Street/Cambridge Street. These trips were then distributed throughout the study area network. The resulting increase in vehicle volumes related to Polar Park are shown in the traffic projection model presented in Appendix B of this report. The traffic signal timings used in the capacity analysis performed for this report are also based on the timings presented in the Polar Park DEIR.

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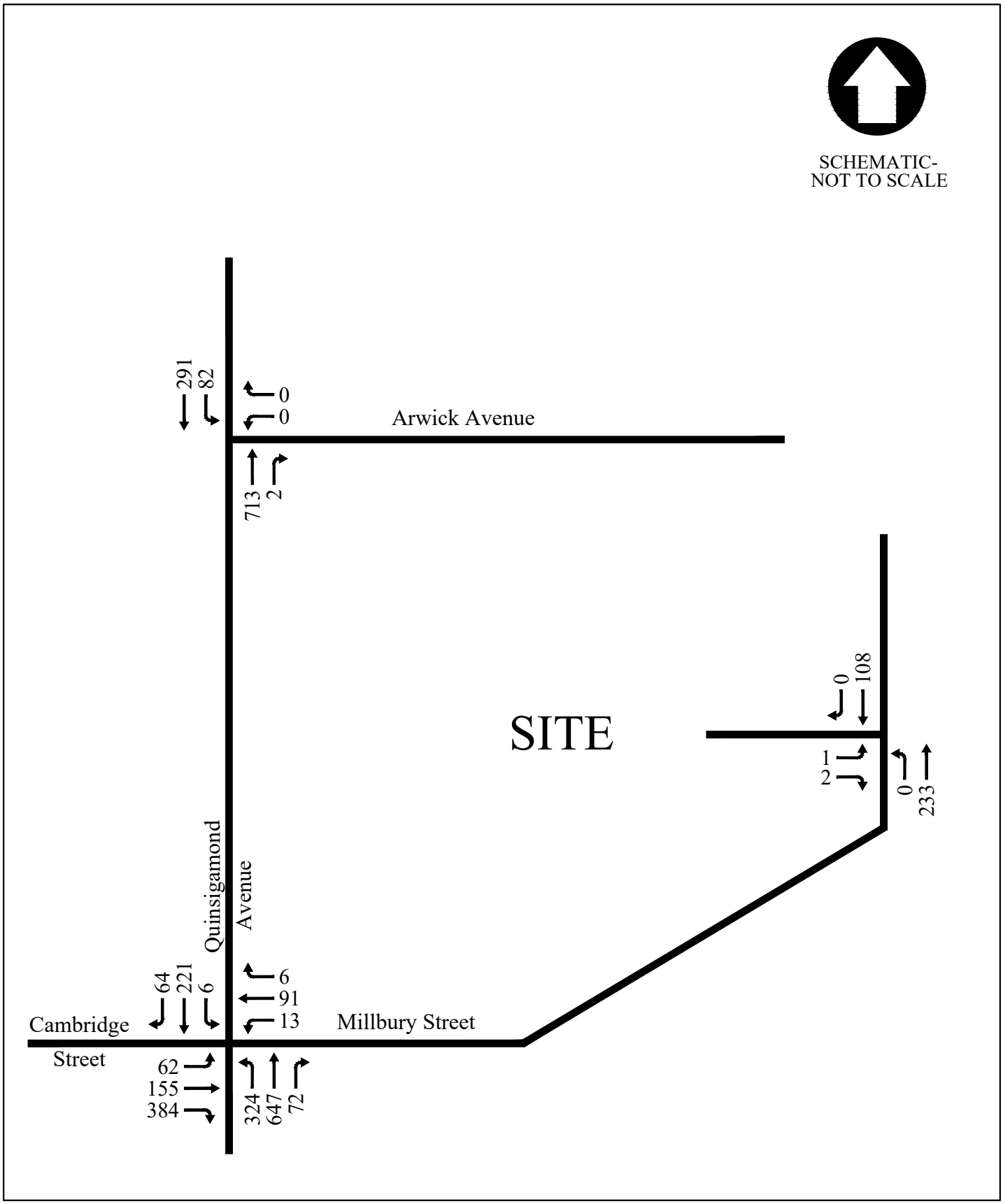

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Figure 2
2021 Existing Weekday Morning
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

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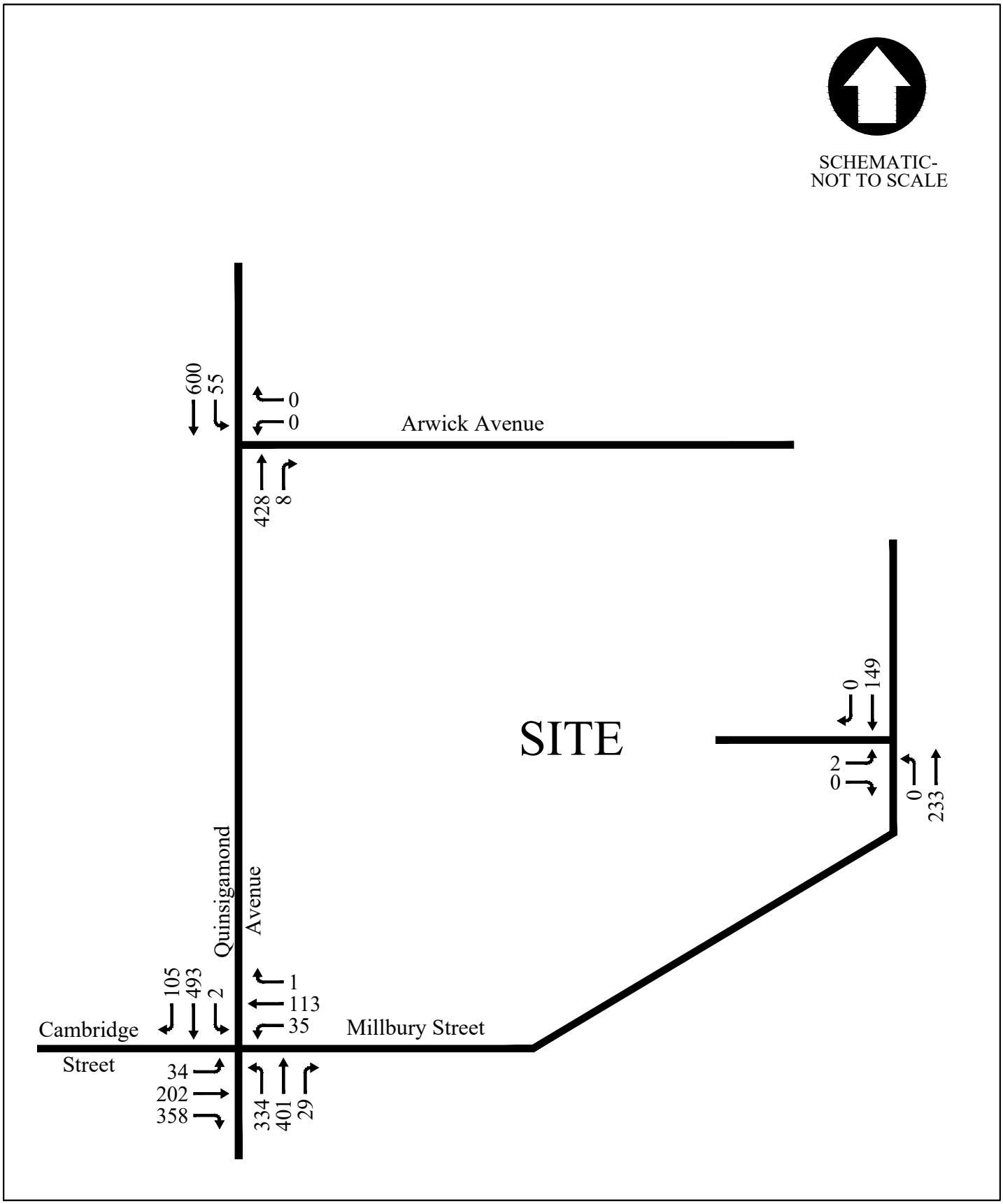

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Figure 3
2021 Existing Weekday Afternoon
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

Crash Summary

Crash data for the study area intersections was obtained from MassDOT for the five-year period from 2014 through 2018. A summary of the crash data is presented in Appendix B.

The MassDOT Crash Rate Worksheet equations were used to determine whether the crash frequencies at the study area intersections were unusually high given the travel demands at each location. The MassDOT Crash Rate Worksheet calculates a crash rate expressed in crashes per million entering vehicles. The calculated rate was then compared to the average rate for signalized and unsignalized intersections statewide and within MassDOT District 3. For signalized intersections, the statewide average crash rate is 0.78 crashes per million entering vehicles and the MassDOT District 3 crash rate is 0.89 crashes per million entering vehicles. For unsignalized intersections, the statewide average crash rate is 0.57 crashes per million entering vehicles and the MassDOT District 3 crash rate is 0.61 crashes per million entering vehicles.

From 2014 through 2018, a total of 36 crashes were reported at the intersection of Quinsigamond Avenue at Millbury Street/Cambridge Street, equivalent to a crash rate of 0.91 crashes per million entering vehicles, which is slightly above the District 3 average of 0.89 crashes per million entering vehicles. Of the 36 reported crashes at the intersection, over half (17) were rear-end collisions, and nine were angle collisions, both typical of signalized intersections. An additional seven of the reported crashes were single vehicle crashes, two were sideswipe collisions, and the manner of collision of one is unknown. Of the 36 reported crashes during the five-year period analyzed, twelve resulted in personal injury and 19 resulted in property damage only; the severity of the five remaining crashes is unknown.

From 2014 to 2018, two crashes are reported at the intersection of Quinsigamond Avenue at Arwick Avenue, equivalent to 0.10 crashes per million entering vehicles. One crash was an angle collision, and the other was a single vehicle crash. Both crashes were reported to result in property damage only.

FUTURE CONDITIONS

To determine future traffic demands on the study area roadways and intersections, the 2021 Existing traffic volumes were projected to the future-year 2028, in accordance with MassDOT guidelines. Traffic volumes on the study area roadways in 2028 are assumed to include all existing traffic, as well as new traffic resulting from general growth in the study area and from other planned development projects, independent of the proposed project. The potential background traffic growth, unrelated to the proposed project, was considered in the development of the 2028 No Build (without project) peak hour traffic volumes. The estimated traffic increases associated with the proposed project were then added to the 2028 No Build volumes to reflect the 2028 Build (with project) traffic conditions. A more detailed description of the development of the 2028 No Build and 2028 Build traffic volume networks is presented below.

Future Roadway Improvements

Planned roadway improvement projects can impact travel patterns and future traffic operations. MassDOT project information and the City of Worcester were consulted to develop an understanding of future area roadway improvement projects. No major additional projects which would be expected to affect future traffic conditions at the study area intersections were identified.

Background Traffic Growth

Traffic growth is generally a function of changes in motor vehicle use and expected land development within the area. In order to predict the rate at which traffic on the study area roadways can be expected to grow during the seven-year forecast period (2021 to 2028), both planned area developments and historic traffic growth were reviewed.

Site-Specific Growth
Based on discussions with the City of Worcester Planning Department, no planned developments were identified that would be anticipated to impact traffic volumes within the study area.

Historic Traffic Growth
Based on discussions with the City of Worcester Planning Department, a background traffic growth rate of 0.25% for urban centers, estimated by the Central Massachusetts Regional Planning Commission (CMRPC), was recommended.

2028 No Build Traffic Volumes

The 2021 Existing peak hour traffic volumes were grown by 0.25 percent per year (compounded annually) over the seven-year study horizon (2021 to 2028) to establish the

2028 No Build weekday morning and weekday afternoon peak hour traffic volumes, which are illustrated in Figure 4 and Figure 5, respectively. The 2028 No Build traffic volumes are documented in the traffic projection model presented in Appendix B of this report.

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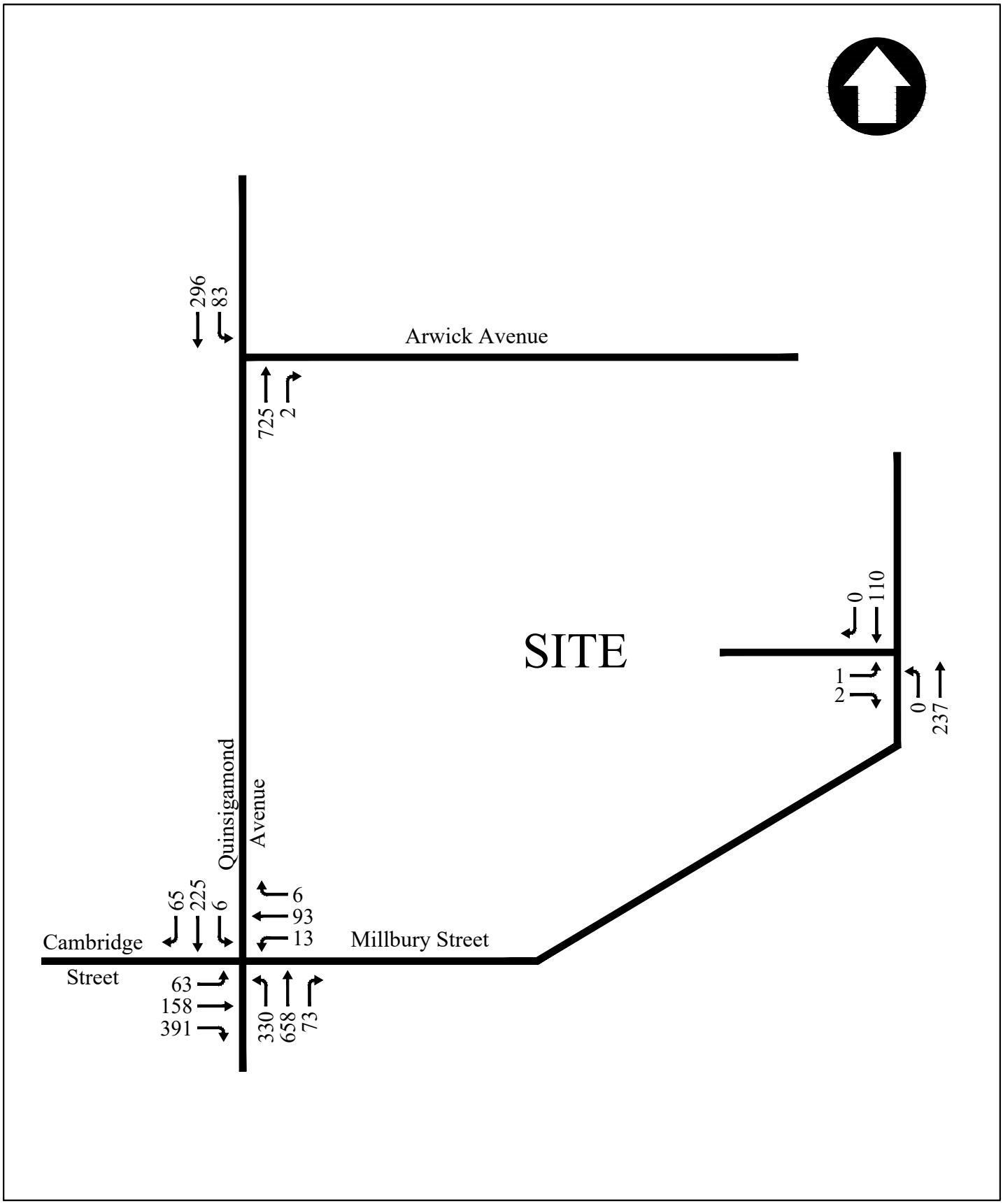

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Figure 4
2028 No Build Weekday Morning
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

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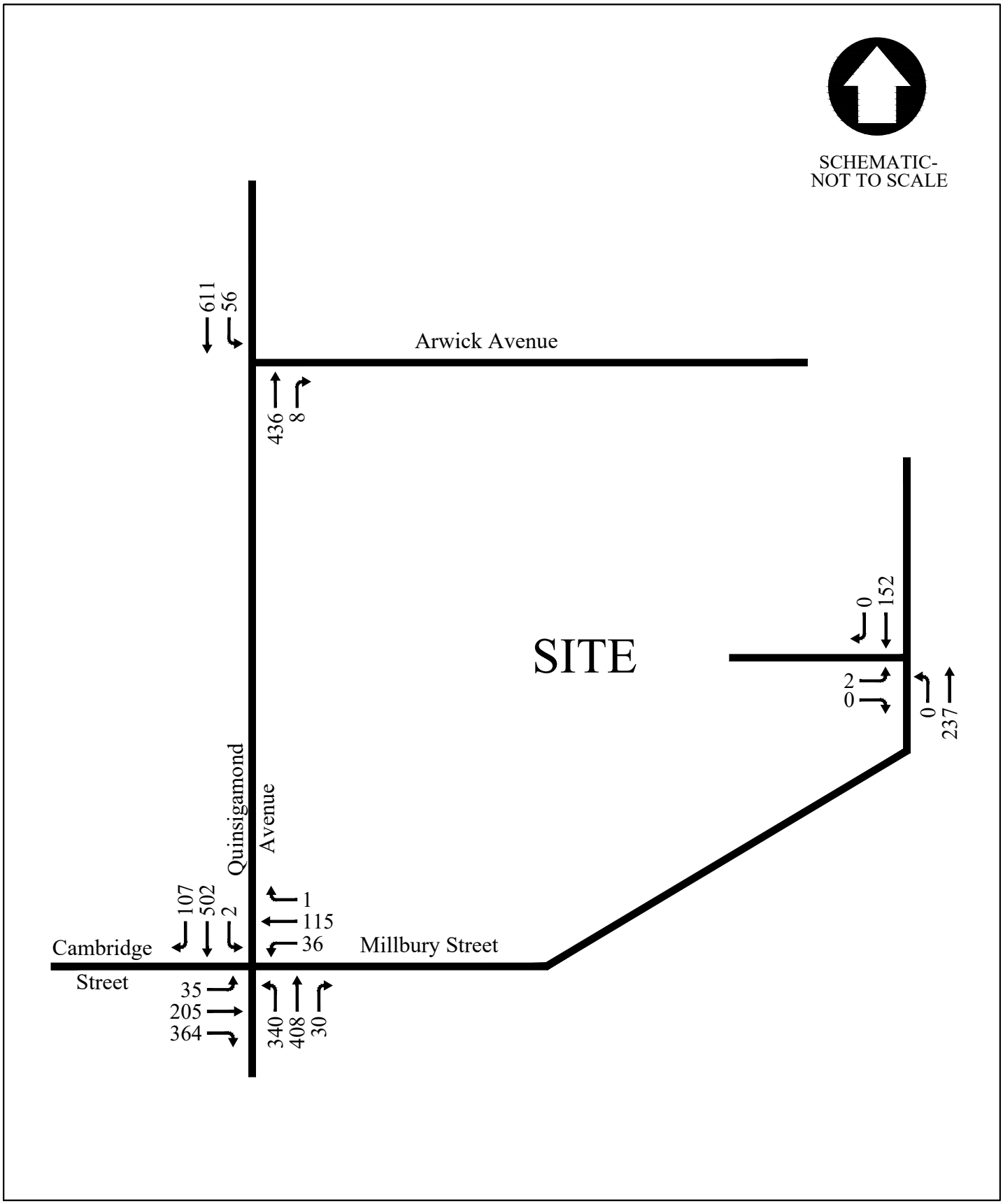

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Figure 5
2028 No Build Weekday Afternoon
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

Site-Generated Traffic

In order to estimate the number of vehicle trips associated with the proposed Neon Marketplace convenience store and gas station, the Institute of Transportation Engineers' (ITE) publication, *Trip Generation Manual, 10th Edition,* was referenced. ITE is a national research organization of transportation professionals, and *Trip Generation Manual, 10th Edition* provides traffic generation information for various land uses compiled from studies conducted by members nationwide. Vehicle trip estimates for the proposed convenience store and gas station were developed based on data presented in this publication for Land Use Code 960 (Super Convenience Market/Gas Station). This reference establishes vehicle trip rates, in this case expressed in trips per 1,000 square feet of convenience store gross floor area, based on actual traffic counts conducted at similar types of existing land uses. Table 1 below presents the total estimated vehicle trips associated with the proposed convenience store and gas station development.

Table 1: Project Trips

		Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	**Size**	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Convenience Store & Gas Station[1]	5,620 sf	254	254	508	195	195	390

1 ITE Land Use Code 960 (Super Convenience Market/Gas Station), based on 5,620 sf.

Not all trips to convenience stores and gas stations are "new" trips. A significant portion of the total trips attracted to such retail uses are "pass-by" trips. According to ITE, for Land Use Code 960 (Super Convenience Market/Gas Station), approximately 76 percent of the total weekday morning and weekday afternoon peak hour trips to this type of use are attributed to pass-by trips. The vehicle trips expected to be generated by the proposed convenience store and gas station development are separated into pass-by vehicle trips and new vehicles trips, as shown in Table 2.

Table 2: Pass-By Vehicle Trips

	Weekday AM Peak Hour			Weekday PM Peak Hour		
Description	**In**	**Out**	**Total**	**In**	**Out**	**Total**
Convenience Store Trips	254	254	508	195	195	390
- Pass-by Trips[1]	-193	-193	-386	-148	-148	-296
New Project Trips	61	61	122	47	47	94

1 Based on ITE LUC 960, 76% of AM and PM trips are attributed to "pass-by" trips.

As shown in Table 2, the peak hour trip generation of the proposed development is estimated to result in an increase of approximately 122 new vehicle trips (61 entering vehicles and 61 exiting vehicles) during the weekday morning peak hour and an increase of

approximately 94 new vehicles trips (47 entering vehicles and 47 exiting vehicles) during the weekday afternoon peak hour.

ITE does not provide specific data for convenience stores with drive-through windows. In order to estimate the potential impact of the proposed drive-through attached to the convenience store, data from the *Trip Generation Manual, 10th Edition,* for Land Use Code 934 (Fast-Food Restaurant with Drive-Through) was referenced. This land use is estimated to generate weekday morning and weekday afternoon vehicle trips at approximately half the rate of Land Use Code 960 which was used to estimate the vehicle trips for the proposed development. Since trip generation estimate rates for Fast-Food Restaurant with Drive-Through are lower per square foot than rates for Super Convenience Market/Gas Station, Land Use Code for Super Convenience Market/Gas Station was utilized for the entire floor area of the proposed building to provide a more conservative estimate of vehicle trip generation of the proposed development.

The project site is located in a dense urban environment, adjacent to an existing pedestrian network, bus route, and residential neighborhood. Under these conditions, a number of project site trips would be expected to travel to and from the site using modes other than a single occupancy vehicle. In order to present a more conservative analysis, no reductions to the estimated number of trips traveling to and from the project site were made.

Arwick Avenue Two-Way Operations

As part of the proposed development, Arwick Avenue would be proposed to be converted to two-way operations for its entire length between Quinsigamond Avenue and Millbury Street. The project proponent will work with the City of Worcester, through the appropriate channels, to modify the roadway to a two-way roadway. Therefore, for the purposes of this report, the 2028 Build condition is projected to include two-way operation on Arwick Avenue. Based on the surrounding roadway network, the overall volume of vehicles which would be anticipated to travel westbound on Arwick Avenue independent of the proposed convenience store and gas station would be considered to be low. In order to provide a more conservative estimate of 2028 Build condition vehicle volumes, approximately one percent of the 2028 No Build traffic which currently travels in either direction between Millbury Street/Harding Street to the north and Quinsigamond Avenue to the south was rerouted via Arwick Avenue westbound under 2028 Build conditions. This rerouting is documented in the traffic projection model presented in Appendix B.

Project Trip Distribution and Assignment

The additional traffic estimated to be generated by the proposed development was distributed onto the study area roadways and intersections based on the existing travel patterns of the adjacent roadways. Vehicle trips accessing the project site were assigned to the site driveways based on ease of access to and from the roadway network. The resulting

arrival and departure patterns are presented in Figure 6 and are documented in the traffic projection model located in Appendix B.

The project-related traffic was then assigned to the surrounding roadway network based on the project trip distribution patterns presented in Figure 6. The resulting distributed new project trips are shown in Figure 7 and Figure 8 for the weekday morning and weekday afternoon peak hours, respectively.

2028 Build Traffic Volumes

To establish the 2028 Build peak hour traffic volumes, the distributed new project trips shown in Figure 7 and Figure 8 were then added to the 2028 No Build peak hour traffic volumes to reflect the 2028 Build peak hour traffic volumes. The resulting 2028 Build weekday morning and weekday afternoon peak hour traffic volumes are presented in Figure 9 and Figure 10, respectively. The 2028 Build traffic volumes are documented in the traffic projection model presented in Appendix B of this report.

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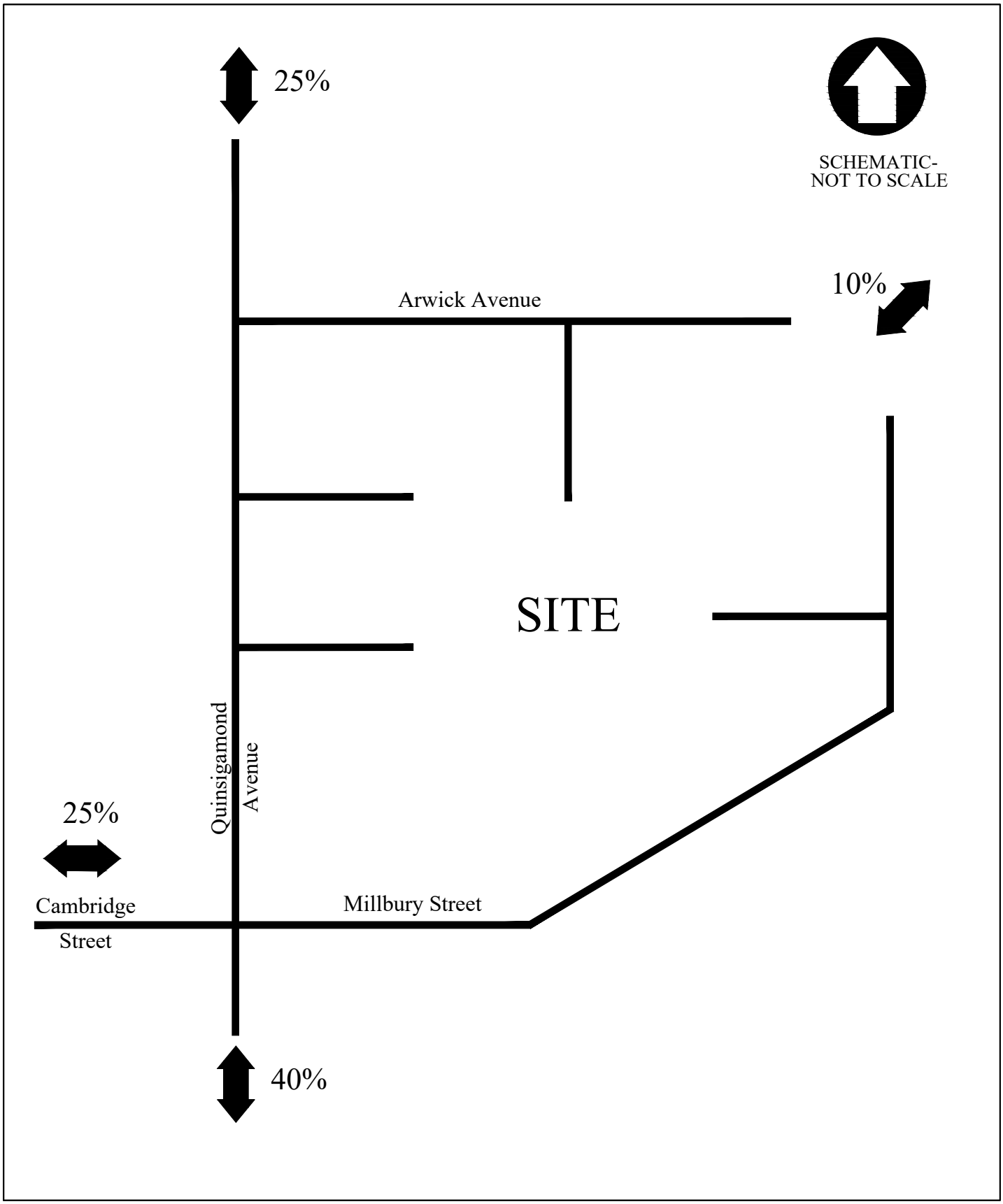

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Figure 6
Direction of Arrivals and Departures
Convenience Store & Gas Station
Worcester, Massachusetts

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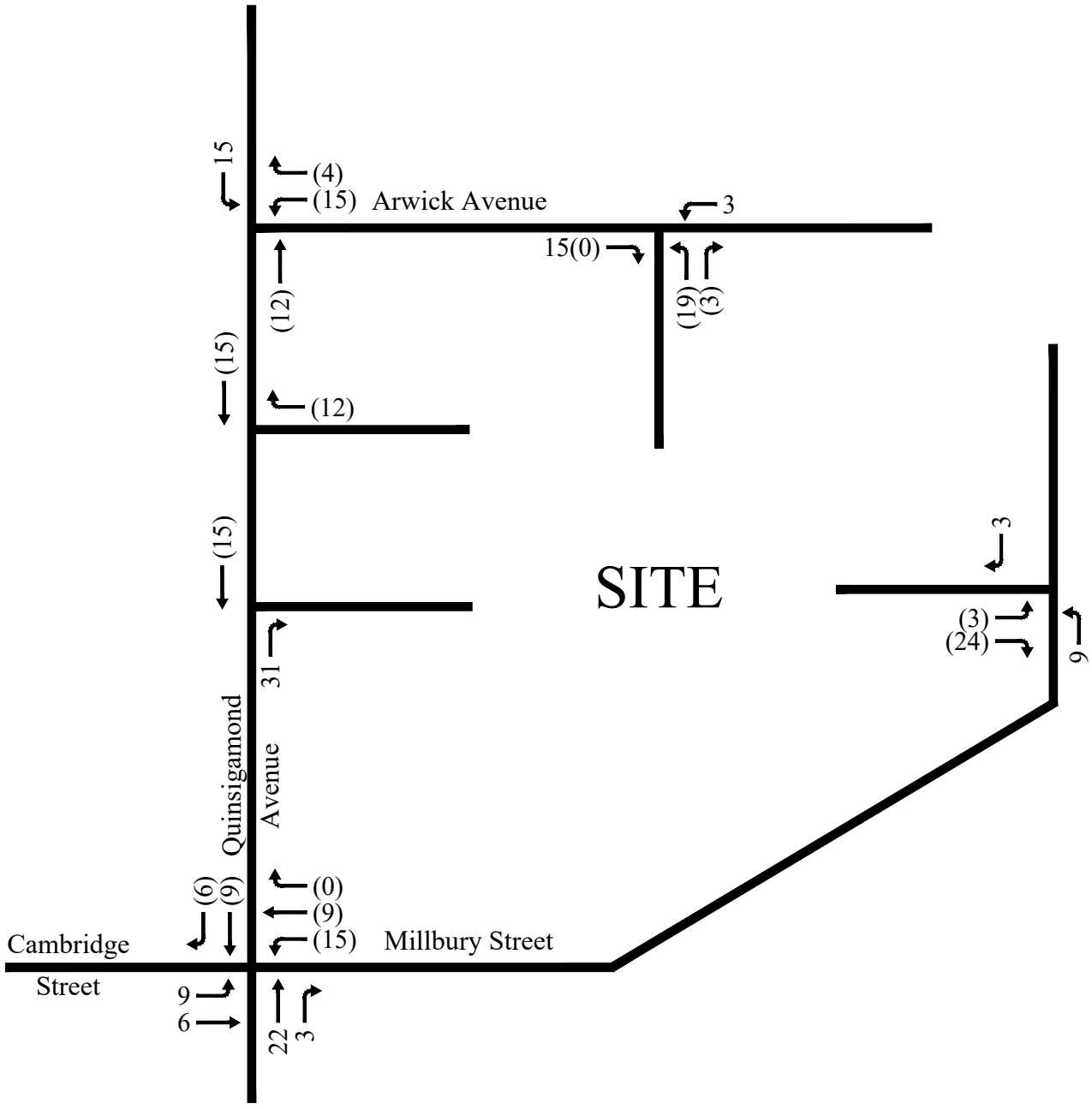

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Figure 7
Weekday Morning Peak Hour
New Project Trips
Convenience Store & Gas Station
Worcester, Massachusetts

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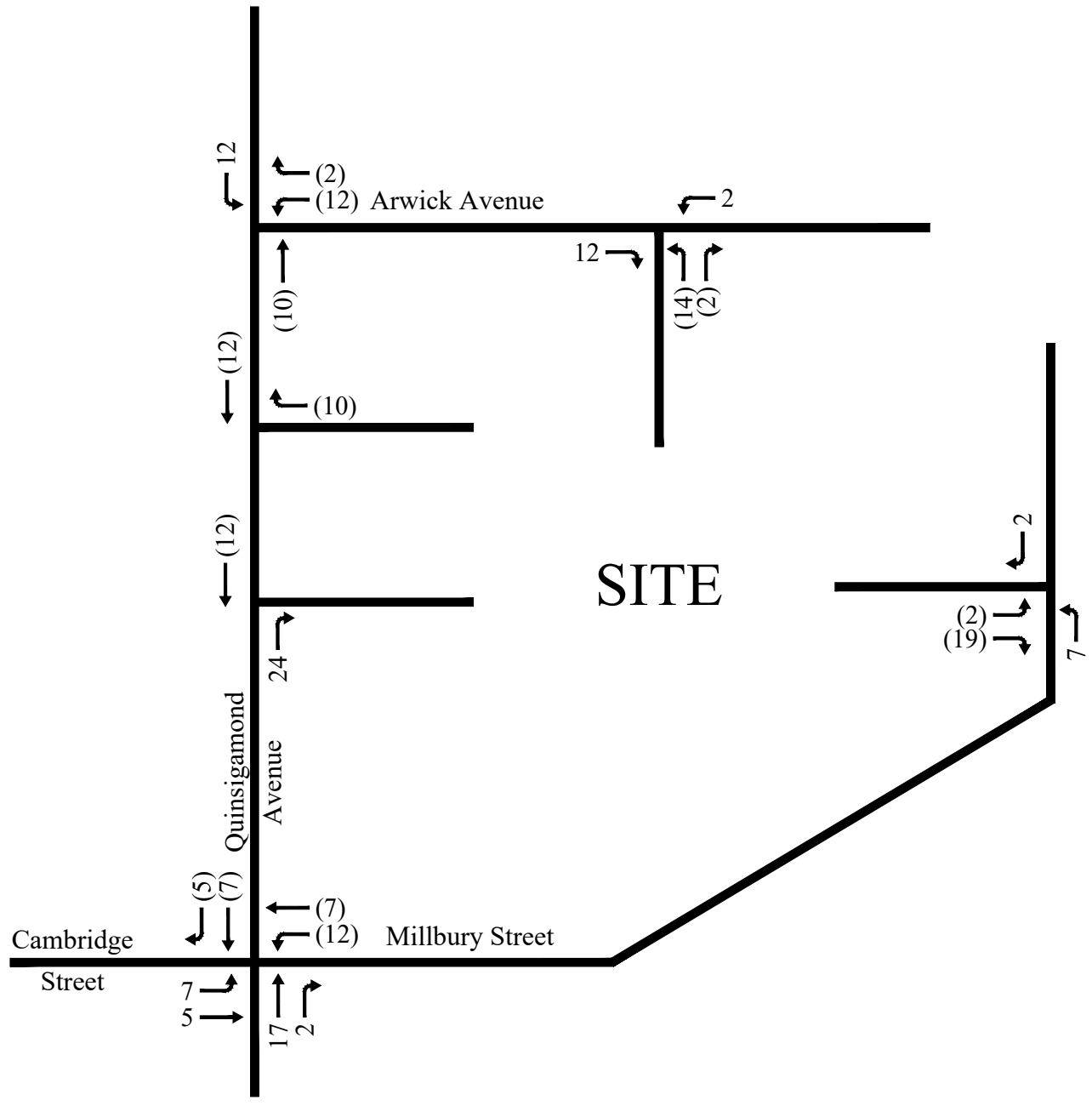

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Figure 8
Weekday Afternoon Peak Hour
New Project Trips
Convenience Store & Gas Station
Worcester, Massachusetts

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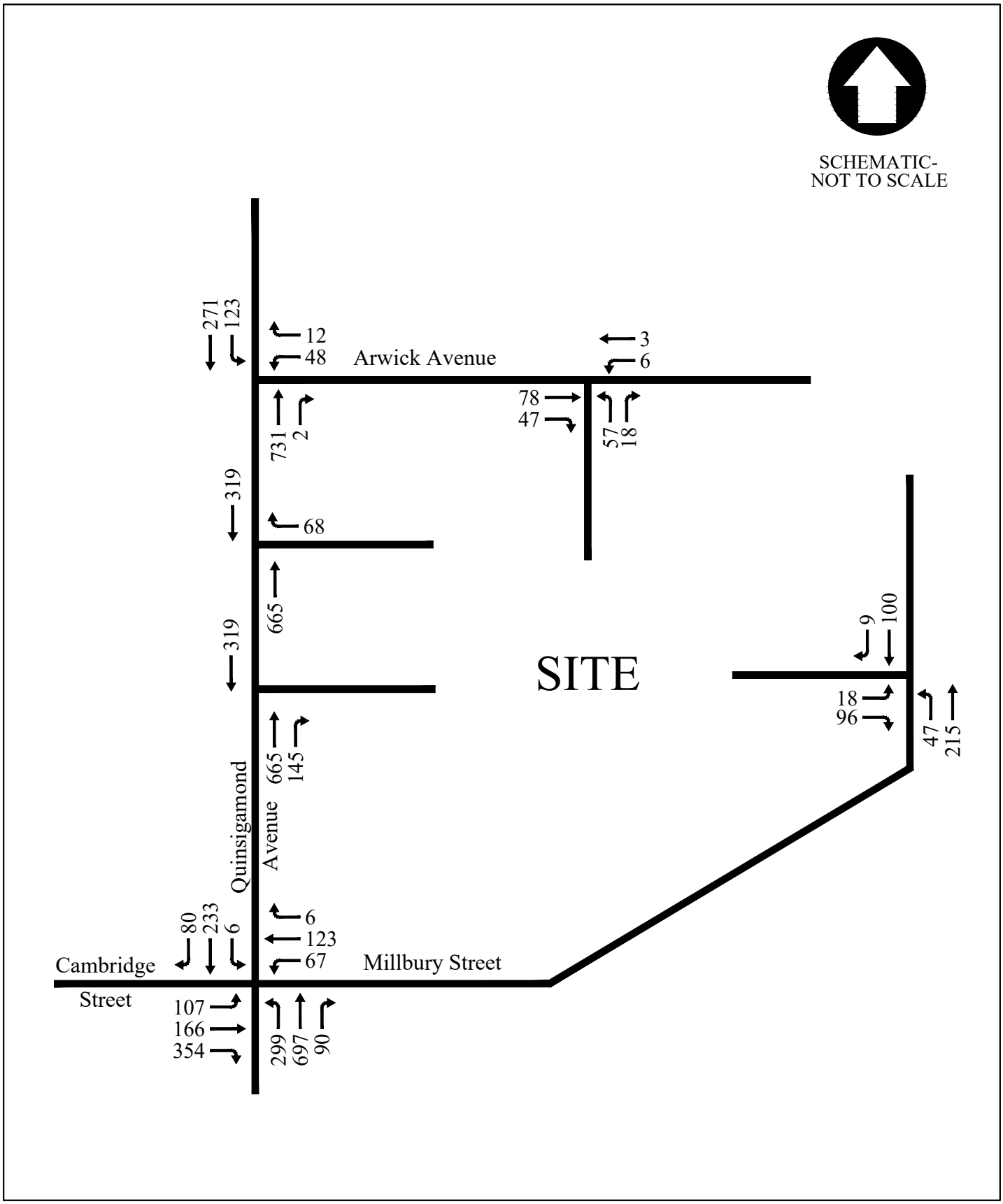

Figure 9
2028 Build Weekday Morning
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

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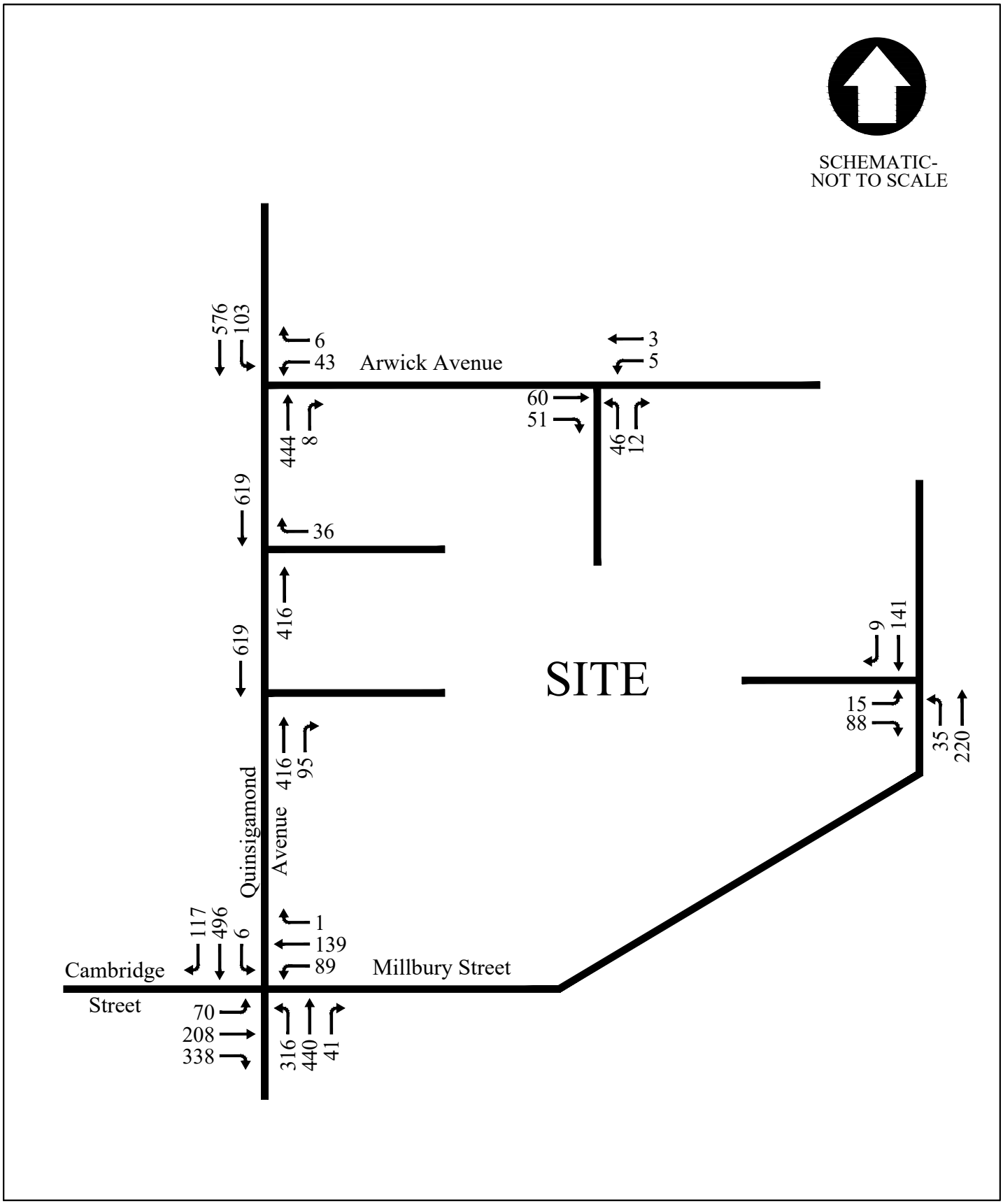

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Figure 10
2028 Build Weekday Afternoon
Peak Hour Traffic Volumes
Convenience Store & Gas Station
Worcester, Massachusetts

TRAFFIC OPERATIONS ANALYSIS

In previous sections of this report, the quantity of traffic at the study area intersections has been discussed. This section describes the overall quality of the traffic flow at the study area intersections during the weekday morning and weekday afternoon peak hours. As a basis for this assessment, intersection capacity analysis was conducted using the Synchro capacity analysis software at the study area intersections under the 2021 Existing, 2028 No Build, and 2028 Build peak hour traffic conditions. The analysis is based on Synchro capacity analysis methodologies and procedures contained in the *Highway Capacity Manual, 6th Edition* (HCM), which are summarized in Appendix D. A discussion of the evaluation criteria and a summary of the results of the capacity analysis are presented below.

Level-of-Service Criteria

Average total vehicle delay is reported as level-of-service (LOS) on a scale of A to F. LOS A represents delays of 10 seconds or less and LOS F represents delays in excess of 50 seconds for unsignalized intersections and greater than 80 seconds for signalized intersections. A more detailed description of the LOS criteria is provided in Appendix D.

Capacity Analysis Results

Intersection capacity analysis was conducted using Synchro capacity analysis software for the study area intersections to evaluate the 2021 Existing, 2028 No Build, and 2028 Build traffic conditions during the weekday morning and weekday afternoon peak hours. The peak hour traffic volumes utilized as part of this analysis are provided in the traffic projection model, attached in Appendix B of this report.

The Synchro capacity analysis results for the 2021 Existing, 2028 No Build and 2028 Build traffic conditions are presented in Appendix E, Appendix F, and Appendix G, respectively. The overall results of the intersection capacity analysis for the signalized intersection of Quinsigamond Avenue at Millbury Street/Cambridge Street are presented in Table 3 below. The capacity analysis results for the critical stop-controlled movements at the intersection of Quinsigamond Avenue at Arwick Avenue and the proposed site driveways are presented in Table 4. A more detailed summary of the capacity analysis for each study area intersection is provided in Appendix H. The results of the specific capacity analysis at the study area intersections are discussed below.

Table 3: Signalized Intersection Capacity Analysis

		2021 Existing			2028 No Build			2028 Build		
Intersection	**Period**	**LOS[1]**	**Delay[2]**	**ICU[3]**	**LOS**	**Delay**	**ICU**	**LOS**	**Delay**	**ICU**
Quinsigamond Avenue at	AM	C	30.8	0.59	C	31.3	0.60	D	39.7	0.72
Cambridge Street/Millbury Street	PM	D	40.2	0.76	D	41.5	0.77	D	49.4	0.82

1 Level-of-Service

2 Average vehicle delay in seconds

3 Intersection capacity utilization ratio

As shown in Table 3, the signalized intersection of Quinsigamond Avenue at Cambridge Street/Millbury Street is shown to currently operate at overall LOS C during the weekday morning peak hour and at overall LOS D during weekday afternoon peak hour. Under 2028 No Build conditions, the intersection is projected to continue to operate at overall LOS C during the weekday morning peak hour and at overall LOS D during the weekday afternoon peak hour. Under 2028 Build conditions, the intersection is projected to operate at overall LOS D during both the weekday morning and weekday afternoon peak hours, with approximately eight seconds of overall additional average vehicle delay during each period compared to 2028 No Build conditions.

Table 4: Stop-Controlled Intersections Capacity Analysis

			2028 Build		
Intersection	**Movement**	**Period**	**LOS[1]**	**Delay[2]**	**V/C[3]**
Quinsigamond Avenue	WB LR	AM	E	38.8	0.38
at Arwick Avenue		PM	D	30.4	0.28
Quinsigamond Avenue	WB R	AM	B	11.5	0.12
at North Site Driveway		PM	B	10.1	0.05
Arwick Avenue at	NB LR	AM	A	9.7	0.10
Site Driveway		PM	A	9.3	0.07
Millbury Street at	EB LR	AM	B	10.4	0.16
Site Driveway		PM	B	10.2	0.14

1 Level-of-Service

2 Average vehicle delay in seconds

3 Volume to capacity ratio

As shown in Table 4, the stop-controlled westbound Arwick Avenue approach to its intersection with Quinsigamond Avenue is projected to operate at LOS E during the weekday morning peak hour and at LOS D during the weekday afternoon peak hour. The westbound movements are projected to operate well under capacity and with minimal queuing. The Arwick Avenue approach is expected to be utilized primarily by drivers

exiting the site, and as such delay experienced on the westbound Arwick Avenue approach would be expected to primarily be experienced by patrons of the proposed convenience store and gas station.

Under 2028 Build conditions, all movements exiting the proposed site driveways are projected to operate at LOS B or better, under capacity, and with minimal queuing during both peak hours.

One-way Arwick Avenue Circulation

As discussed in a previous section of this report, it is proposed that Arwick Avenue be converted to two-way operations for its entire length as part of the project. The analysis described above includes the conversion to two-way directionality on Arwick Avenue. In order to understand how the proposed project would affect the study area without the conversion of Arwick Avenue, capacity analyses were also performed for a 2028 Build condition which maintains the one-way operations on Arwick Avenue. The results of these analyses are considered to be comparable to the capacity analysis reported above. With more project site traffic directed to the signalized intersection under the existing one-way condition of Arwick Avenue, the overall delay at the intersection is shown to increase by less than three seconds during both the weekday morning and weekday afternoon peak hours compared to the proposed two-way condition.

Site Access and Circulation

Access to the site would be provided via one right-in only and one right-out only driveway on Quinsigamond Avenue, one full-access driveway on Arwick Avenue (following the conversion of Arwick Avenue to two-way operations), and one full-access driveway on Millbury Street. The proposed site driveways are expected to provide safe and efficient access to the site and minimize traffic impacts to the surrounding roadway network. The site layout has been designed to provide safe and efficient access throughout the site, including for refueling operations.

Sight Distance

A field review of the available sight distance was conducted at the proposed site driveway locations on Quinsigamond Avenue, Arwick Avenue and Millbury Street. The American Association of State Highway and Transportation Officials (AASHTO) publication, *A Policy on Geometric Design, 2018 Edition*, defines minimum and recommended sight distances at intersections. The minimum sight distance is based on the required stopping sight distance (SSD) for vehicles traveling along the main road. According to AASHTO, "If the available sight distance for an entering or crossing vehicle is at least equal to the appropriate stopping sight distance for the major road, then drivers have sufficient time to anticipate and avoid collisions."

In order to accurately assess required sight distance on Quinsigamond Avenue, a field speed study of vehicles at free flow speeds on Quinsigamond Avenue was performed. The recorded speeds were reviewed and the 85th percentile free flow vehicle speed in the northbound direction was determined to be approximately 38 mph. This 85th percentile speed was utilized to determine the required and recommended sight distances at the proposed right-out site driveway on Quinsigamond Avenue.

Table 5 summarizes the AASHTO sight distance standards for the 85th percentile speeds on Quinsigamond Avenue and the statutory speed limit on Arwick Avenue and Millbury Street, and the available sight distance measured at each driveway.

Table 5: Site Driveway Sight Distance Requirements

Access Location	Looking	Speed Limit (mph)	85th % Speed (mph)	SSD[1] Required	Sight Distance[2] Measured
Quinsigamond Avenue	Left (South)	30	38	280	600+
Arwick Avenue	Left (West)	30	-	200	130[3]
	Right (East)	30	-	200	250
Millbury Street	Left (North)	30	-	200	335
	Right (South)	30	-	200	285

1 Stopping sight distance (see AASHTO equations 3-2 and 3-3) for the statutory speed limit or 85th percentile speeds.

2 All measured sight distances extend to or beyond the adjacent intersections.

3 Sight distance extends to the end of Arwick Avenue at its intersection with Quinsigamond Avenue.

As shown in Table 5, the available sight distance for vehicles exiting the site onto Quinsigamond Avenue is approximately 600 feet, which is beyond its intersection with Millbury Street/Cambridge Street and exceeds the required stopping sight distance the estimated 85th percentile speed on the roadway.

At the proposed site driveways on Arwick Avenue and Millbury Street, the measured sight distances in both directions extend through the adjacent intersections, where vehicles can be expected to be traveling at slower speeds due to completion of turning movements or circulation through the intersection.

Based on the available sight distances at the proposed site driveway locations, all driveways are expected to provide sufficient sight distance to allow vehicles to safely exit the site.

As part of the proposed development, Arwick Avenue is be proposed to be converted to two-way operations for its entire length between Quinsigamond Avenue and Millbury Street. The required and measured sight distances were also assessed for westbound vehicles turning from Arwick Avenue onto Quinsigamond Avenue, and are presented in Table 6 below.

Table 6: Arwick Avenue Sight Distance Requirements

Location	Looking	Speed Limit (mph)	85th % Speed (mph)	SSD[1] Required	Sight Distance Measured
Quinsigamond Avenue	Left (South)	30	38	280	600+
at Arwick Avenue	Right (North)	30	40	305	600+

1 Stopping sight distance (see AASHTO equations 3-2 and 3-3) for the 85th percentile speeds.

As shown in Table 6, the available sight distance for vehicles turning from Arwick Avenue onto Quinsigamond Avenue in each direction is shown to exceed the required sight distances for the estimated 85 percentile operating speeds along Quinsigamond Avenue. Vehicles traveling from Arwick Avenue to Quinsigamond Avenue under the two-way Arwick Avenue configuration should have sufficient sight lines to safely complete their movements to the north or south.

CONCLUSION

The proposed project would involve the construction of a 5,620 square-foot convenience store with a drive-through and eight gasoline pumps (16 fueling positions) on the currently vacant site at 75 Quinsigamond Avenue in Worcester, MA. Access to the site would be provided via one right-in only driveway and one right-out only driveway on Quinsigamond Avenue, one full-access driveway on Arwick Avenue, and one full-access driveway on Millbury Street. As part of the project, Arwick Avenue is proposed to be modified to provide two-way travel between Quinsigamond Avenue and Millbury Street.

Based on the analysis presented in this assessment, the proposed project is estimated to generate approximately 122 new vehicle trips (61 entering vehicles and 61 exiting vehicles) during the weekday morning peak hour and approximately 94 new vehicle trips (47 entering vehicles and 47 exiting vehicles) during the weekday afternoon peak hour.

The capacity analysis indicates that the proposed development is not projected to have a significant impact on the operations of the roadway network adjacent to the site. The signalized intersection of Quinsigamond Avenue at Cambridge Street/Millbury Street is projected to operate at overall level-of-service D during the weekday morning and weekday afternoon peak hours under 2028 Build conditions. The stop-controlled westbound Arwick Avenue approach is projected to operate at LOS E during the weekday morning peak hour and at LOS D during the weekday afternoon peak hour, with the majority of traffic being patrons of the proposed convenience store and gas station. Each of the proposed site driveways are projected to operate at LOS B or better during both the weekday morning and afternoon peak hours, with negligible impacts on existing mainline operations.

Available sight distance at the site driveways extend to adjacent intersections and exceed required sight distances, and are expected to provide safe access to and from the site.

Based on a review of the analysis contained within this traffic impact study, the proposed convenience store and gas station development is not shown to have a significant impact on the overall traffic operations of the study area intersections and roadways.

McMAHON
TRANSPORTATION ENGINEERS & PLANNERS

Appendix for Traffic Impact Study

Neon Marketplace

Convenience Store & Gas Station

75 Quinsigamond Avenue
Worcester, MA

Prepared by
McMahon Associates, Inc.
120 Water Street, 4th Floor
Boston, MA 02109
617.556.0020

Prepared for
Procaccianti Companies

September 2021

APPENDIX A
Turning Movement Counts

Transportation Data Corporation

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N/S: Quinsigamond Avenue/Route 146
E/W: Millbury Street/Cambridge Street
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407A
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	9	51	0	0	0	13	2	0	6	57	62	0	92	19	12	0	323
07:15 AM	13	42	0	0	0	16	3	1	6	74	58	0	90	24	5	0	332
07:30 AM	14	39	1	0	1	22	3	0	7	81	54	0	97	23	13	0	355
07:45 AM	18	53	1	0	2	14	1	0	23	134	70	0	80	30	15	0	441
Total	54	185	2	0	3	65	9	1	42	346	244	0	359	96	45	0	1451
08:00 AM	9	34	1	0	1	21	3	0	4	96	71	2	67	40	14	0	363
08:15 AM	9	39	3	1	1	24	6	0	2	126	77	0	74	31	13	0	406
08:30 AM	17	39	0	0	0	14	1	0	30	142	52	0	99	27	4	0	425
08:45 AM	16	43	2	0	0	23	3	0	24	129	64	0	86	29	9	0	428
Total	51	155	6	1	2	82	13	0	60	493	264	2	326	127	40	0	1622
Grand Total	105	340	8	1	5	147	22	1	102	839	508	2	685	223	85	0	3073
Apprch %	23.1	74.9	1.8	0.2	2.9	84	12.6	0.6	7	57.8	35	0.1	69	22.5	8.6	0	
Total %	3.4	11.1	0.3	0	0.2	4.8	0.7	0	3.3	27.3	16.5	0.1	22.3	7.3	2.8	0	
Cars & Peds	98	325	7	1	4	140	20	1	100	812	493	2	667	220	82	0	2972
% Cars & Peds	93.3	95.6	87.5	100	80	95.2	90.9	100	98	96.8	97	100	97.4	98.7	96.5	0	96.7
Trucks & Buses																	
% Trucks & Buses	6.7	4.4	12.5	0	20	4.8	9.1	0	2	3.2	3	0	2.6	1.3	3.5	0	3.3
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**18**	**53**	1	0	**72**	**2**	14	1	0	17	23	134	70	0	**227**	80	30	**15**	0	125	**441**
08:00 AM	9	34	1	0	44	1	21	3	0	25	4	96	71	**2**	173	67	**40**	14	0	121	363
08:15 AM	9	39	**3**	**1**	52	1	**24**	**6**	0	**31**	2	126	**77**	0	205	74	31	13	0	118	406
08:30 AM	17	39	0	0	56	0	14	1	0	15	**30**	**142**	52	0	224	**99**	27	4	0	**130**	425
Total Volume	53	165	5	1	224	4	73	11	0	88	59	498	270	2	829	320	128	46	0	494	1635
% App. Total	23.7	73.7	2.2	0.4		4.5	83	12.5	0		7.1	60.1	32.6	0.2		64.8	25.9	9.3	0		
PHF	.736	.778	.417	.250	.778	.500	.760	.458	.000	.710	.492	.877	.877	.250	.913	.808	.800	.767	.000	.950	.927
Cars & Peds	51	158	5	1	215	3	68	11	0	82	58	479	264	2	803	314	125	44	0	483	1583
% Cars & Peds	96.2	95.8	100	100	96.0	75.0	93.2	100	0	93.2	98.3	96.2	97.8	100	96.9	98.1	97.7	95.7	0	97.8	96.8
Trucks & Buses	2	7	0	0	9	1	5	0	0	6	1	19	6	0	26	6	3	2	0	11	52
% Trucks & Buses	3.8	4.2	0	0	4.0	25.0	6.8	0	0	6.8	1.7	3.8	2.2	0	3.1	1.9	2.3	4.3	0	2.2	3.2
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Transportation Data Corporation

Mario Perone, mperone1@verizon.net
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N/S: Quinsigamond Avenue/Route 146
E/W: Millbury Street/Cambridge Street
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407A
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	6	49	0	0	0	12	1	0	6	56	60	0	88	19	12	0	309
07:15 AM	12	42	0	0	0	16	3	1	6	72	54	0	87	24	4	0	321
07:30 AM	14	37	0	0	1	22	2	0	7	80	53	0	94	23	13	0	346
07:45 AM	18	50	1	0	2	13	1	0	22	130	68	0	79	30	14	0	428
Total	50	178	1	0	3	63	7	1	41	338	235	0	348	96	43	0	1404
08:00 AM	9	33	1	0	0	20	3	0	4	91	70	2	65	39	13	0	350
08:15 AM	9	39	3	1	1	22	6	0	2	121	76	0	74	30	13	0	397
08:30 AM	15	36	0	0	0	13	1	0	30	137	50	0	96	26	4	0	408
08:45 AM	15	39	2	0	0	22	3	0	23	125	62	0	84	29	9	0	413
Total	48	147	6	1	1	77	13	0	59	474	258	2	319	124	39	0	1568
Grand Total	98	325	7	1	4	140	20	1	100	812	493	2	667	220	82	0	2972
Apprch %	22.7	75.4	1.6	0.2	2.4	84.8	12.1	0.6	7.1	57.7	35	0.1	68.8	22.7	8.5	0	
Total %	3.3	10.9	0.2	0	0.1	4.7	0.7	0	3.4	27.3	16.6	0.1	22.4	7.4	2.8	0	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**18**	**50**	1	0	**69**	**2**	13	1	0	16	22	130	68	0	**220**	79	30	**14**	0	123	**428**
08:00 AM	9	33	1	0	43	0	20	3	0	23	4	91	70	**2**	167	65	**39**	13	0	117	350
08:15 AM	9	39	**3**	**1**	52	1	**22**	**6**	0	**29**	2	121	**76**	0	199	74	30	13	0	117	397
08:30 AM	15	36	0	0	51	0	13	1	0	14	**30**	**137**	50	0	217	**96**	26	4	0	**126**	408
Total Volume	51	158	5	1	215	3	68	11	0	82	58	479	264	2	803	314	125	44	0	483	1583
% App. Total	23.7	73.5	2.3	0.5		3.7	82.9	13.4	0		7.2	59.7	32.9	0.2		65	25.9	9.1	0		
PHF	.708	.790	.417	.250	.779	.375	.773	.458	.000	.707	.483	.874	.868	.250	.913	.818	.801	.786	.000	.958	.925

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N/S: Quinsigamond Avenue/Route 146
E/W: Millbury Street/Cambridge Street
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407A
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Trucks & Buses

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	3	2	0	0	0	1	1	0	0	1	2	0	4	0	0	0	14
07:15 AM	1	0	0	0	0	0	0	0	0	2	4	0	3	0	1	0	11
07:30 AM	0	2	1	0	0	0	1	0	0	1	1	0	3	0	0	0	9
07:45 AM	0	3	0	0	0	1	0	0	1	4	2	0	1	0	1	0	13
Total	4	7	1	0	0	2	2	0	1	8	9	0	11	0	2	0	47
08:00 AM	0	1	0	0	1	1	0	0	0	5	1	0	2	1	1	0	13
08:15 AM	0	0	0	0	0	2	0	0	0	5	1	0	0	1	0	0	9
08:30 AM	2	3	0	0	0	1	0	0	0	5	2	0	3	1	0	0	17
08:45 AM	1	4	0	0	0	1	0	0	1	4	2	0	2	0	0	0	15
Total	3	8	0	0	1	5	0	0	1	19	6	0	7	3	1	0	54
Grand Total	7	15	1	0	1	7	2	0	2	27	15	0	18	3	3	0	101
Apprch %	30.4	65.2	4.3	0	10	70	20	0	4.5	61.4	34.1	0	75	12.5	12.5	0	
Total %	6.9	14.9	1	0	1	6.9	2	0	2	26.7	14.9	0	17.8	3	3	0	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	0	1	0	0	1	**1**	1	0	0	**2**	0	**5**	1	0	6	2	**1**	**1**	0	**4**	13
08:15 AM	0	0	0	0	0	0	**2**	0	0	2	0	5	1	0	6	0	1	0	0	1	9
08:30 AM	**2**	3	0	0	**5**	0	1	0	0	1	0	5	**2**	0	**7**	**3**	1	0	0	4	**17**
08:45 AM	1	**4**	0	0	5	0	1	0	0	1	**1**	4	2	0	7	2	0	0	0	2	15
Total Volume	3	8	0	0	11	1	5	0	0	6	1	19	6	0	26	7	3	1	0	11	54
% App. Total	27.3	72.7	0	0		16.7	83.3	0	0		3.8	73.1	23.1	0		63.6	27.3	9.1	0		
PHF	.375	.500	.000	.000	.550	.250	.625	.000	.000	.750	.250	.950	.750	.000	.929	.583	.750	.250	.000	.688	.794

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File Name : 05407A
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Bikes by Direction

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total %																	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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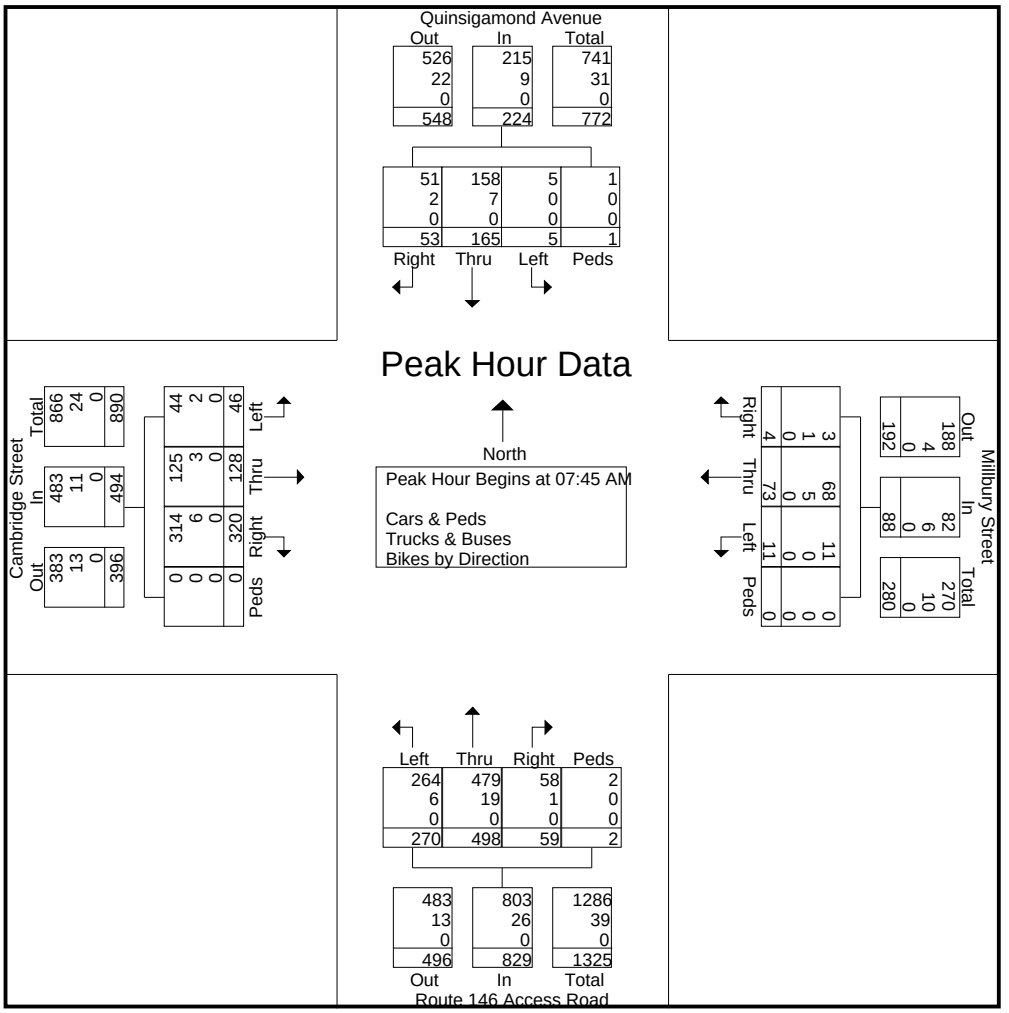
	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	**18**	**53**	1	0	**72**	**2**	14	1	0	17	23	134	70	0	**227**	80	30	**15**	0	125	**441**
08:00 AM	9	34	1	0	44	1	21	3	0	25	4	96	71	**2**	173	67	**40**	14	0	121	363
08:15 AM	9	39	**3**	**1**	52	1	**24**	**6**	0	**31**	2	126	**77**	0	205	74	31	13	0	118	406
08:30 AM	17	39	0	0	56	0	14	1	0	15	**30**	**142**	52	0	224	**99**	27	4	0	**130**	425
Total Volume	53	165	5	1	224	4	73	11	0	88	59	498	270	2	829	320	128	46	0	494	1635
% App. Total	23.7	73.7	2.2	0.4		4.5	83	12.5	0		7.1	60.1	32.6	0.2		64.8	25.9	9.3	0		
PHF	.736	.778	.417	.250	.778	.500	.760	.458	.000	.710	.492	.877	.877	.250	.913	.808	.800	.767	.000	.950	.927
Cars & Peds	51	158	5	1	215	3	68	11	0	82	58	479	264	2	803	314	125	44	0	483	1583
% Cars & Peds	96.2	95.8	100	100	96.0	75.0	93.2	100	0	93.2	98.3	96.2	97.8	100	96.9	98.1	97.7	95.7	0	97.8	96.8
Trucks & Buses	2	7	0	0	9	1	5	0	0	6	1	19	6	0	26	6	3	2	0	11	52
% Trucks & Buses	3.8	4.2	0	0	4.0	25.0	6.8	0	0	6.8	1.7	3.8	2.2	0	3.1	1.9	2.3	4.3	0	2.2	3.2
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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N/S: Quinsigamond Avenue/Route 146
E/W: Millbury Street/Cambridge Street
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407AA
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	16	94	0	0	1	24	8	0	1	89	63	0	92	66	7	0	461
04:15 PM	25	127	0	0	0	26	11	3	7	103	80	2	75	42	10	0	511
04:30 PM	27	109	0	0	0	26	8	0	9	90	77	0	104	43	4	0	497
04:45 PM	16	78	1	1	0	30	7	0	8	74	71	0	92	58	5	0	441
Total	84	408	1	1	1	106	34	3	25	356	291	2	363	209	26	0	1910
05:00 PM	22	113	1	0	1	26	7	0	4	83	90	0	70	48	7	0	472
05:15 PM	17	111	1	1	0	20	5	0	8	74	72	1	71	47	10	0	438
05:30 PM	17	87	0	2	1	25	6	3	4	82	88	0	70	45	9	0	439
05:45 PM	18	61	2	0	0	24	7	0	5	73	88	0	69	38	9	0	394
Total	74	372	4	3	2	95	25	3	21	312	338	1	280	178	35	0	1743
Grand Total	158	780	5	4	3	201	59	6	46	668	629	3	643	387	61	0	3653
Apprch %	16.7	82.4	0.5	0.4	1.1	74.7	21.9	2.2	3.4	49.6	46.7	0.2	58.9	35.5	5.6	0	
Total %	4.3	21.4	0.1	0.1	0.1	5.5	1.6	0.2	1.3	18.3	17.2	0.1	17.6	10.6	1.7	0	
Cars & Peds	156	771	5	4	3	198	58	6	45	653	621	3	637	381	61	0	3602
% Cars & Peds	98.7	98.8	100	100	100	98.5	98.3	100	97.8	97.8	98.7	100	99.1	98.4	100	0	98.6
Trucks & Buses																	
% Trucks & Buses	1.3	1	0	0	0	1	1.7	0	0	2.2	1.1	0	0.9	1.3	0	0	1.3
Bikes by Direction	0	1	0	0	0	1	0	0	1	0	1	0	0	1	0	0	5
% Bikes by Direction	0	0.1	0	0	0	0.5	0	0	2.2	0	0.2	0	0	0.3	0	0	0.1

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	25	**127**	0	0	**152**	0	26	**11**	**3**	**40**	7	**103**	80	**2**	**192**	75	42	**10**	0	127	**511**
04:30 PM	**27**	109	0	0	136	0	26	8	0	34	**9**	90	77	0	176	**104**	43	4	0	151	497
04:45 PM	16	78	**1**	**1**	96	0	**30**	7	0	37	8	74	71	0	153	92	**58**	5	0	**155**	441
05:00 PM	22	113	1	0	136	**1**	26	7	0	34	4	83	**90**	0	177	70	48	7	0	125	472
Total Volume	90	427	2	1	520	1	108	33	3	145	28	350	318	2	698	341	191	26	0	558	1921
% App. Total	17.3	82.1	0.4	0.2		0.7	74.5	22.8	2.1		4	50.1	45.6	0.3		61.1	34.2	4.7	0		
PHF	.833	.841	.500	.250	.855	.250	.900	.750	.250	.906	.778	.850	.883	.250	.909	.820	.823	.650	.000	.900	.940
Cars & Peds	89	422	2	1	514	1	107	33	3	144	27	339	312	2	680	336	188	26	0	550	1888
% Cars & Peds	98.9	98.8	100	100	98.8	100	99.1	100	100	99.3	96.4	96.9	98.1	100	97.4	98.5	98.4	100	0	98.6	98.3
Trucks & Buses	1	4	0	0	5	0	1	0	0	1	0	11	5	0	16	5	3	0	0	8	30
% Trucks & Buses	1.1	0.9	0	0	1.0	0	0.9	0	0	0.7	0	3.1	1.6	0	2.3	1.5	1.6	0	0	1.4	1.6
Bikes by Direction	0	1	0	0	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	3
% Bikes by Direction	0	0.2	0	0	0.2	0	0	0	0	0	3.6	0	0.3	0	0.3	0	0	0	0	0	0.2

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N/S: Quinsigamond Avenue/Route 146
E/W: Millbury Street/Cambridge Street
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407AA
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	15	91	0	0	1	24	8	0	1	87	61	0	92	66	7	0	453
04:15 PM	25	124	0	0	0	26	11	3	7	97	78	2	74	41	10	0	498
04:30 PM	26	108	0	0	0	26	8	0	8	88	75	0	101	43	4	0	487
04:45 PM	16	78	1	1	0	30	7	0	8	72	70	0	91	56	5	0	435
Total	82	401	1	1	1	106	34	3	24	344	284	2	358	206	26	0	1873
05:00 PM	22	112	1	0	1	25	7	0	4	82	89	0	70	48	7	0	468
05:15 PM	17	110	1	1	0	20	5	0	8	73	72	1	71	46	10	0	435
05:30 PM	17	87	0	2	1	23	6	3	4	82	88	0	70	45	9	0	437
05:45 PM	18	61	2	0	0	24	6	0	5	72	88	0	68	36	9	0	389
Total	74	370	4	3	2	92	24	3	21	309	337	1	279	175	35	0	1729
Grand Total	156	771	5	4	3	198	58	6	45	653	621	3	637	381	61	0	3602
Apprch %	16.7	82.4	0.5	0.4	1.1	74.7	21.9	2.3	3.4	49.4	47	0.2	59	35.3	5.7	0	
Total %	4.3	21.4	0.1	0.1	0.1	5.5	1.6	0.2	1.2	18.1	17.2	0.1	17.7	10.6	1.7	0	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	25	**124**	0	0	**149**	0	26	**11**	**3**	**40**	7	**97**	78	**2**	**184**	74	41	**10**	0	125	**498**
04:30 PM	**26**	108	0	0	134	0	26	8	0	34	**8**	88	75	0	171	**101**	43	4	0	148	487
04:45 PM	16	78	**1**	**1**	96	0	**30**	7	0	37	8	72	70	0	150	91	**56**	5	0	**152**	435
05:00 PM	22	112	1	0	135	**1**	25	7	0	33	4	82	**89**	0	175	70	48	7	0	125	468
Total Volume	89	422	2	1	514	1	107	33	3	144	27	339	312	2	680	336	188	26	0	550	1888
% App. Total	17.3	82.1	0.4	0.2		0.7	74.3	22.9	2.1		4	49.9	45.9	0.3		61.1	34.2	4.7	0		
PHF	.856	.851	.500	.250	.862	.250	.892	.750	.250	.900	.844	.874	.876	.250	.924	.832	.839	.650	.000	.905	.948

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City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407AA
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Trucks & Buses

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	1	3	0	0	0	0	0	0	0	2	2	0	0	0	0	0	8
04:15 PM	0	2	0	0	0	0	0	0	0	6	2	0	1	1	0	0	12
04:30 PM	1	1	0	0	0	0	0	0	0	2	2	0	3	0	0	0	9
04:45 PM	0	0	0	0	0	0	0	0	0	2	0	0	1	2	0	0	5
Total	2	6	0	0	0	0	0	0	0	12	6	0	5	3	0	0	34
05:00 PM	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	4
05:15 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2
05:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	1	2	0	0	5
Total	0	2	0	0	0	2	1	0	0	3	1	0	1	2	0	0	12
Grand Total	2	8	0	0	0	2	1	0	0	15	7	0	6	5	0	0	46
Apprch %	20	80	0	0	0	66.7	33.3	0	0	68.2	31.8	0	54.5	45.5	0	0	
Total %	4.3	17.4	0	0	0	4.3	2.2	0	0	32.6	15.2	0	13	10.9	0	0	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	**1**	**3**	0	0	**4**	0	0	0	0	0	0	2	**2**	0	4	0	0	0	0	0	8
04:15 PM	0	2	0	0	2	0	0	0	0	0	0	**6**	2	0	**8**	1	1	0	0	2	**12**
04:30 PM	1	1	0	0	2	0	0	0	0	0	0	2	2	0	4	**3**	0	0	0	**3**	9
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	1	**2**	0	0	3	5
Total Volume	2	6	0	0	8	0	0	0	0	0	0	12	6	0	18	5	3	0	0	8	34
% App. Total	25	75	0	0		0	0	0	0		0	66.7	33.3	0		62.5	37.5	0	0		
PHF	.500	.500	.000	.000	.500	.000	.000	.000	.000	.000	.000	.500	.750	.000	.563	.417	.375	.000	.000	.667	.708

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N/S: Quinsigamond Avenue/Route 146
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City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407AA
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Bikes by Direction

	Quinsigamond Avenue From North				Millbury Street From East				Route 146 Access Road From South				Cambridge Street From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
04:30 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Total	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	0	3
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
05:30 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2
Grand Total	0	1	0	0	0	1	0	0	1	0	1	0	0	1	0	0	5
Apprch %	0	100	0	0	0	100	0	0	50	0	50	0	0	100	0	0	
Total %	0	20	0	0	0	20	0	0	20	0	20	0	0	20	0	0	

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Right			Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	**1**	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
04:30 PM	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	**1**	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	1	0	0	0	0	0	1
Total Volume	0	1	0	0	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	3
% App. Total	0	100	0	0		0	0	0	0		50	0	50	0		0	0	0	0		
PHF	.000	.250	.000	.000	.250	.000	.000	.000	.000	.000	.250	.000	.250	.000	.500	.000	.000	.000	.000	.000	.750

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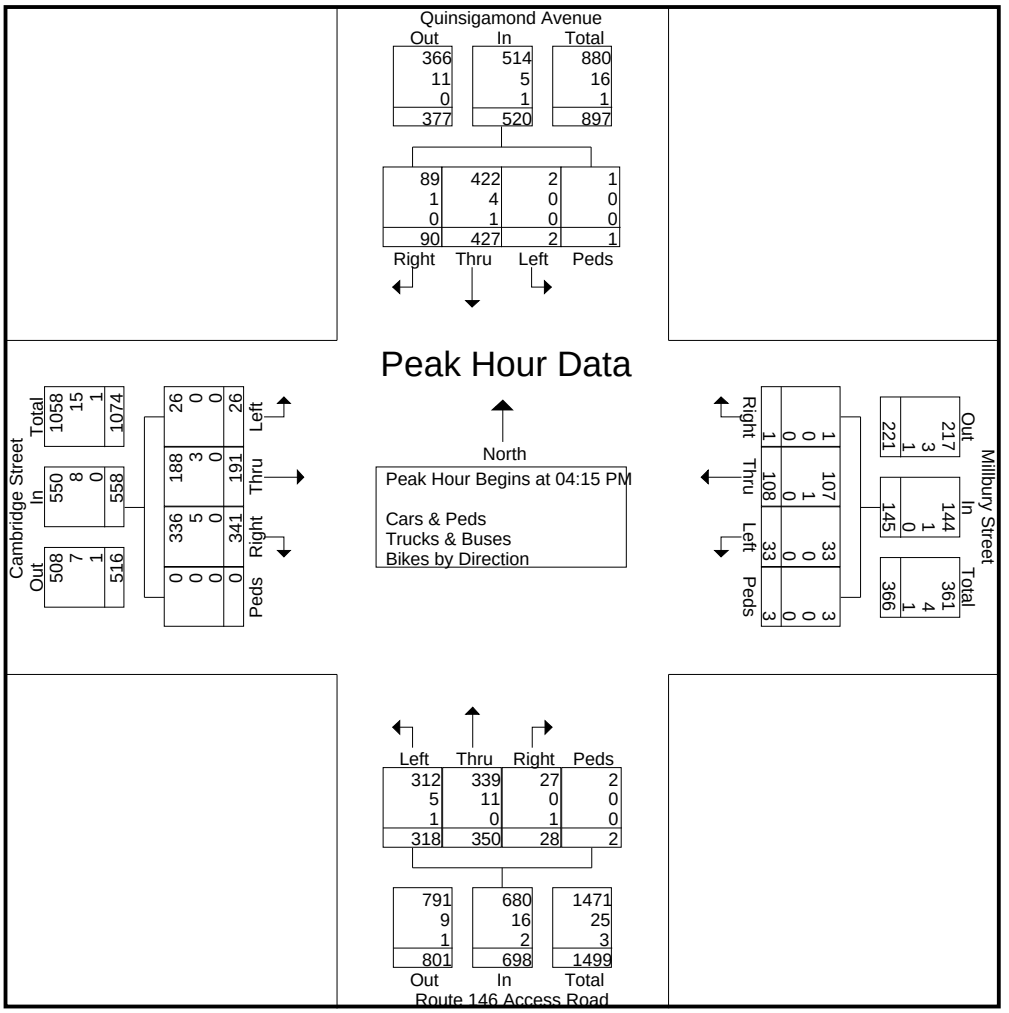
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407AA
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

	Quinsigamond Avenue From North					Millbury Street From East					Route 146 Access Road From South					Cambridge Street From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:15 PM																					
04:15 PM	25	**127**	0	0	**152**	0	26	**11**	**3**	**40**	7	**103**	80	**2**	**192**	75	42	**10**	0	127	**511**
04:30 PM	**27**	109	0	0	136	0	26	8	0	34	**9**	90	77	0	176	**104**	43	4	0	151	497
04:45 PM	16	78	**1**	**1**	96	0	**30**	7	0	37	8	74	71	0	153	92	**58**	5	0	**155**	441
05:00 PM	22	113	1	0	136	**1**	26	7	0	34	4	83	**90**	0	177	70	48	7	0	125	472
Total Volume	90	427	2	1	520	1	108	33	3	145	28	350	318	2	698	341	191	26	0	558	1921
% App. Total	17.3	82.1	0.4	0.2		0.7	74.5	22.8	2.1		4	50.1	45.6	0.3		61.1	34.2	4.7	0		
PHF	.833	.841	.500	.250	.855	.250	.900	.750	.250	.906	.778	.850	.883	.250	.909	.820	.823	.650	.000	.900	.940
Cars & Peds	89	422	2	1	514	1	107	33	3	144	27	339	312	2	680	336	188	26	0	550	1888
% Cars & Peds	98.9	98.8	100	100	98.8	100	99.1	100	100	99.3	96.4	96.9	98.1	100	97.4	98.5	98.4	100	0	98.6	98.3
Trucks & Buses	1	4	0	0	5	0	1	0	0	1	0	11	5	0	16	5	3	0	0	8	30
% Trucks & Buses	1.1	0.9	0	0	1.0	0	0.9	0	0	0.7	0	3.1	1.6	0	2.3	1.5	1.6	0	0	1.4	1.6
Bikes by Direction	0	1	0	0	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	3
% Bikes by Direction	0	0.2	0	0	0.2	0	0	0	0	0	3.6	0	0.3	0	0.3	0	0	0	0	0	0.2



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N/S: Quinsigamond Avenue
E: Arwick Avenue
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407B
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
07:00 AM	59	5	0	0	0	0	1	71	0	136
07:15 AM	61	7	0	0	0	1	2	74	0	145
07:30 AM	64	8	0	0	0	0	3	86	0	161
07:45 AM	64	11	0	0	0	0	0	153	0	228
Total	248	31	0	0	0	1	6	384	0	670
08:00 AM	49	16	0	0	0	0	0	112	0	177
08:15 AM	58	18	0	0	0	0	0	140	0	216
08:30 AM	53	23	0	0	0	0	2	152	0	230
08:45 AM	59	16	0	0	0	0	4	131	0	210
Total	219	73	0	0	0	0	6	535	0	833
Grand Total	467	104	0	0	0	1	12	919	0	1503
Apprch %	81.8	18.2	0	0	0	100	1.3	98.7	0	
Total %	31.1	6.9	0	0	0	0.1	0.8	61.1	0	
Cars & Peds	444	101	0	0	0	1	12	889	0	1447
% Cars & Peds	95.1	97.1	0	0	0	100	100	96.7	0	96.3
Trucks & Buses	23	3	0	0	0	0	0	30	0	56
% Trucks & Buses	4.9	2.9	0	0	0	0	0	3.3	0	3.7
Bikes by Direction	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	**64**	11	0	75	0	0	0	0	0	**153**	0	153	228
08:00 AM	49	16	0	65	0	0	0	0	0	112	0	112	177
08:15 AM	58	18	0	**76**	0	0	0	0	0	140	0	140	216
08:30 AM	53	**23**	0	76	0	0	0	0	**2**	152	0	**154**	**230**
Total Volume	224	68	0	292	0	0	0	0	2	557	0	559	851
% App. Total	76.7	23.3	0		0	0	0		0.4	99.6	0		
PHF	.875	.739	.000	.961	.000	.000	.000	.000	.250	.910	.000	.907	.925
Cars & Peds	216	66	0	282	0	0	0	0	2	536	0	538	820
% Cars & Peds	96.4	97.1	0	96.6	0	0	0	0	100	96.2	0	96.2	96.4
Trucks & Buses	8	2	0	10	0	0	0	0	0	21	0	21	31
% Trucks & Buses	3.6	2.9	0	3.4	0	0	0	0	0	3.8	0	3.8	3.6
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0

Transportation Data Corporation

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N/S: Quinsigamond Avenue
E: Arwick Avenue
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407B
Site Code : Y2118711
Start Date : 4/8/2021
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Groups Printed- Cars & Peds

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
07:00 AM	53	5	0	0	0	0	1	70	0	129
07:15 AM	59	6	0	0	0	1	2	71	0	139
07:30 AM	61	8	0	0	0	0	3	85	0	157
07:45 AM	62	10	0	0	0	0	0	148	0	220
Total	235	29	0	0	0	1	6	374	0	645
08:00 AM	48	16	0	0	0	0	0	106	0	170
08:15 AM	57	18	0	0	0	0	0	135	0	210
08:30 AM	49	22	0	0	0	0	2	147	0	220
08:45 AM	55	16	0	0	0	0	4	127	0	202
Total	209	72	0	0	0	0	6	515	0	802
Grand Total	444	101	0	0	0	1	12	889	0	1447
Apprch %	81.5	18.5	0	0	0	100	1.3	98.7	0	
Total %	30.7	7	0	0	0	0.1	0.8	61.4	0	

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	**62**	10	0	72	0	0	0	0	0	**148**	0	148	**220**
08:00 AM	48	16	0	64	0	0	0	0	0	106	0	106	170
08:15 AM	57	18	0	**75**	0	0	0	0	0	135	0	135	210
08:30 AM	49	**22**	0	71	0	0	0	0	**2**	147	0	**149**	220
Total Volume	216	66	0	282	0	0	0	0	2	536	0	538	820
% App. Total	76.6	23.4	0		0	0	0		0.4	99.6	0		
PHF	.871	.750	.000	.940	.000	.000	.000	.000	.250	.905	.000	.903	.932

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Groups Printed- Trucks & Buses

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
07:00 AM	6	0	0	0	0	0	0	1	0	7
07:15 AM	2	1	0	0	0	0	0	3	0	6
07:30 AM	3	0	0	0	0	0	0	1	0	4
07:45 AM	2	1	0	0	0	0	0	5	0	8
Total	13	2	0	0	0	0	0	10	0	25
08:00 AM	1	0	0	0	0	0	0	6	0	7
08:15 AM	1	0	0	0	0	0	0	5	0	6
08:30 AM	4	1	0	0	0	0	0	5	0	10
08:45 AM	4	0	0	0	0	0	0	4	0	8
Total	10	1	0	0	0	0	0	20	0	31
Grand Total	23	3	0	0	0	0	0	30	0	56
Apprch %	88.5	11.5	0	0	0	0	0	100	0	
Total %	41.1	5.4	0	0	0	0	0	53.6	0	

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	2	**1**	0	3	0	0	0	0	0	5	0	5	8
08:00 AM	1	0	0	1	0	0	0	0	0	**6**	0	**6**	7
08:15 AM	1	0	0	1	0	0	0	0	0	5	0	5	6
08:30 AM	**4**	1	0	**5**	0	0	0	0	0	5	0	5	**10**
Total Volume	8	2	0	10	0	0	0	0	0	21	0	21	31
% App. Total	80	20	0		0	0	0		0	100	0		
PHF	.500	.500	.000	.500	.000	.000	.000	.000	.000	.875	.000	.875	.775

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File Name : 05407B
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Bikes by Direction

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	
Total %										

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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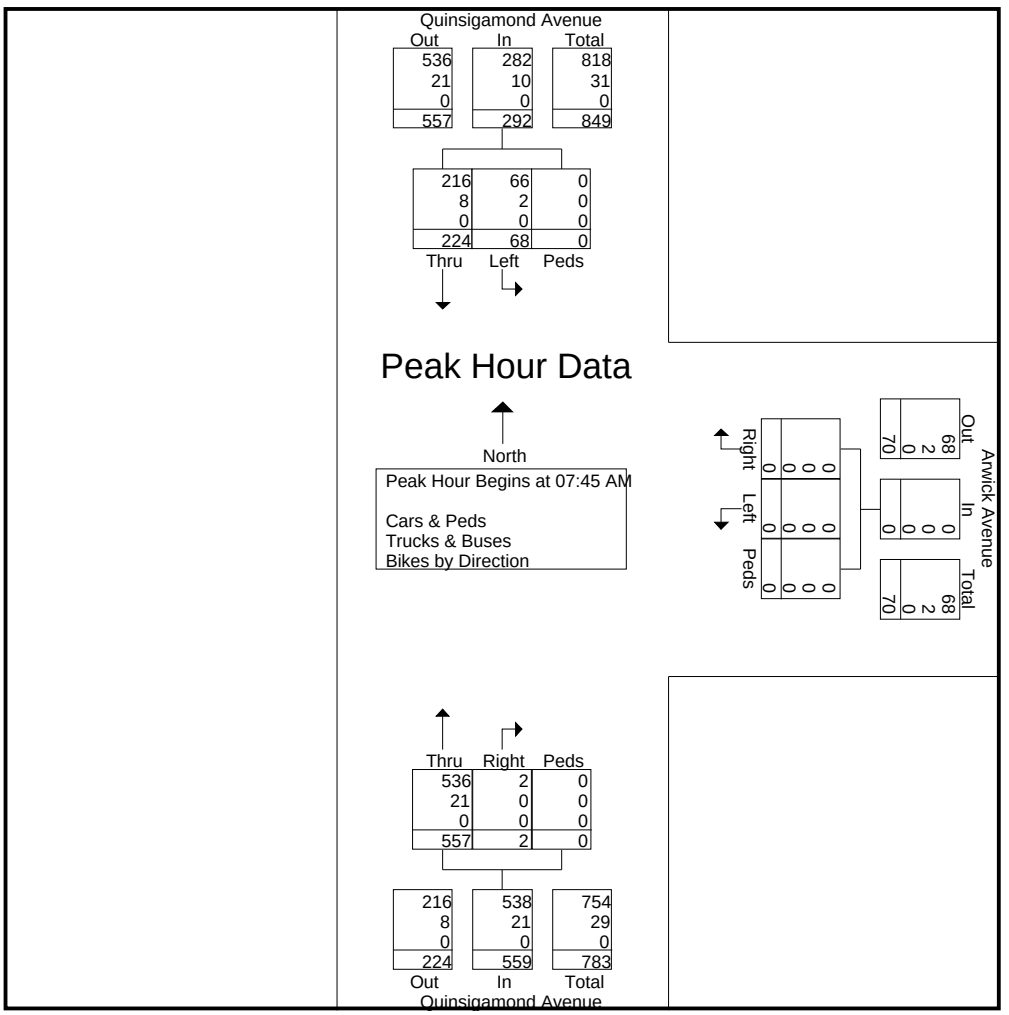
	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	**64**	11	0	75	0	0	0	0	0	**153**	0	153	228
08:00 AM	49	16	0	65	0	0	0	0	0	112	0	112	177
08:15 AM	58	18	0	**76**	0	0	0	0	0	140	0	140	216
08:30 AM	53	**23**	0	76	0	0	0	0	**2**	152	0	**154**	**230**
Total Volume	224	68	0	292	0	0	0	0	2	557	0	559	851
% App. Total	76.7	23.3	0		0	0	0		0.4	99.6	0		
PHF	.875	.739	.000	.961	.000	.000	.000	.000	.250	.910	.000	.907	.925
Cars & Peds	216	66	0	282	0	0	0	0	2	536	0	538	820
% Cars & Peds	96.4	97.1	0	96.6	0	0	0	0	100	96.2	0	96.2	96.4
Trucks & Buses	8	2	0	10	0	0	0	0	0	21	0	21	31
% Trucks & Buses	3.6	2.9	0	3.4	0	0	0	0	0	3.8	0	3.8	3.6
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : 05407BB
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
04:00 PM	111	7	0	0	0	0	2	97	0	217
04:15 PM	149	15	0	0	0	4	1	105	0	274
04:30 PM	128	11	1	0	0	0	1	103	0	244
04:45 PM	103	12	0	0	0	0	2	71	0	188
Total	491	45	1	0	0	4	6	376	0	923
05:00 PM	136	14	0	0	0	0	4	90	0	244
05:15 PM	124	13	0	0	0	0	0	95	0	232
05:30 PM	99	9	0	0	0	3	3	89	0	203
05:45 PM	87	14	0	0	0	0	0	85	0	186
Total	446	50	0	0	0	3	7	359	0	865
Grand Total	937	95	1	0	0	7	13	735	0	1788
Apprch %	90.7	9.2	0.1	0	0	100	1.7	98.3	0	
Total %	52.4	5.3	0.1	0	0	0.4	0.7	41.1	0	
Cars & Peds	928	95	1	0	0	7	13	720	0	1764
% Cars & Peds	99	100	100	0	0	100	100	98	0	98.7
Trucks & Buses	9	0	0	0	0	0	0	15	0	24
% Trucks & Buses	1	0	0	0	0	0	0	2	0	1.3
Bikes by Direction	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	**149**	**15**	0	**164**	0	0	**4**	**4**	1	**105**	0	**106**	**274**
04:30 PM	128	11	**1**	140	0	0	0	0	1	103	0	104	244
04:45 PM	103	12	0	115	0	0	0	0	2	71	0	73	188
05:00 PM	136	14	0	150	0	0	0	0	**4**	90	0	94	244
Total Volume	516	52	1	569	0	0	4	4	8	369	0	377	950
% App. Total	90.7	9.1	0.2		0	0	100		2.1	97.9	0		
PHF	.866	.867	.250	.867	.000	.000	.250	.250	.500	.879	.000	.889	.867
Cars & Peds	511	52	1	564	0	0	4	4	8	358	0	366	934
% Cars & Peds	99.0	100	100	99.1	0	0	100	100	100	97.0	0	97.1	98.3
Trucks & Buses	5	0	0	5	0	0	0	0	0	11	0	11	16
% Trucks & Buses	1.0	0	0	0.9	0	0	0	0	0	3.0	0	2.9	1.7
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0

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Client: McM/Leina Xu

File Name : 05407BB
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Cars & Peds

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
04:00 PM	109	7	0	0	0	0	2	95	0	213
04:15 PM	147	15	0	0	0	4	1	99	0	266
04:30 PM	126	11	1	0	0	0	1	101	0	240
04:45 PM	103	12	0	0	0	0	2	69	0	186
Total	485	45	1	0	0	4	6	364	0	905
05:00 PM	135	14	0	0	0	0	4	89	0	242
05:15 PM	123	13	0	0	0	0	0	94	0	230
05:30 PM	99	9	0	0	0	3	3	89	0	203
05:45 PM	86	14	0	0	0	0	0	84	0	184
Total	443	50	0	0	0	3	7	356	0	859
Grand Total	928	95	1	0	0	7	13	720	0	1764
Apprch %	90.6	9.3	0.1	0	0	100	1.8	98.2	0	
Total %	52.6	5.4	0.1	0	0	0.4	0.7	40.8	0	

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	**147**	**15**	0	**162**	0	0	**4**	**4**	1	99	0	100	**266**
04:30 PM	126	11	**1**	138	0	0	0	0	1	**101**	0	**102**	240
04:45 PM	103	12	0	115	0	0	0	0	2	69	0	71	186
05:00 PM	135	14	0	149	0	0	0	0	**4**	89	0	93	242
Total Volume	511	52	1	564	0	0	4	4	8	358	0	366	934
% App. Total	90.6	9.2	0.2		0	0	100		2.2	97.8	0		
PHF	.869	.867	.250	.870	.000	.000	.250	.250	.500	.886	.000	.897	.878

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Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Trucks & Buses

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
04:00 PM	2	0	0	0	0	0	0	2	0	4
04:15 PM	2	0	0	0	0	0	0	6	0	8
04:30 PM	2	0	0	0	0	0	0	2	0	4
04:45 PM	0	0	0	0	0	0	0	2	0	2
Total	6	0	0	0	0	0	0	12	0	18
05:00 PM	1	0	0	0	0	0	0	1	0	2
05:15 PM	1	0	0	0	0	0	0	1	0	2
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	1	0	0	0	0	0	0	1	0	2
Total	3	0	0	0	0	0	0	3	0	6
Grand Total	9	0	0	0	0	0	0	15	0	24
Apprch %	100	0	0	0	0	0	0	100	0	
Total %	37.5	0	0	0	0	0	0	62.5	0	

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	**2**	0	0	**2**	0	0	0	0	0	2	0	2	4
04:15 PM	2	0	0	2	0	0	0	0	0	**6**	0	**6**	**8**
04:30 PM	2	0	0	2	0	0	0	0	0	2	0	2	4
04:45 PM	0	0	0	0	0	0	0	0	0	2	0	2	2
Total Volume	6	0	0	6	0	0	0	0	0	12	0	12	18
% App. Total	100	0	0		0	0	0		0	100	0		
PHF	.750	.000	.000	.750	.000	.000	.000	.000	.000	.500	.000	.500	.563

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File Name : 05407BB
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Page No : 1

Groups Printed- Bikes by Direction

	Quinsigamond Avenue From North			Arwick Avenue From East			Quinsigamond Avenue From South			
Start Time	Thru	Left	Peds	Right	Left	Peds	Right	Thru	Peds	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	
Total %										

	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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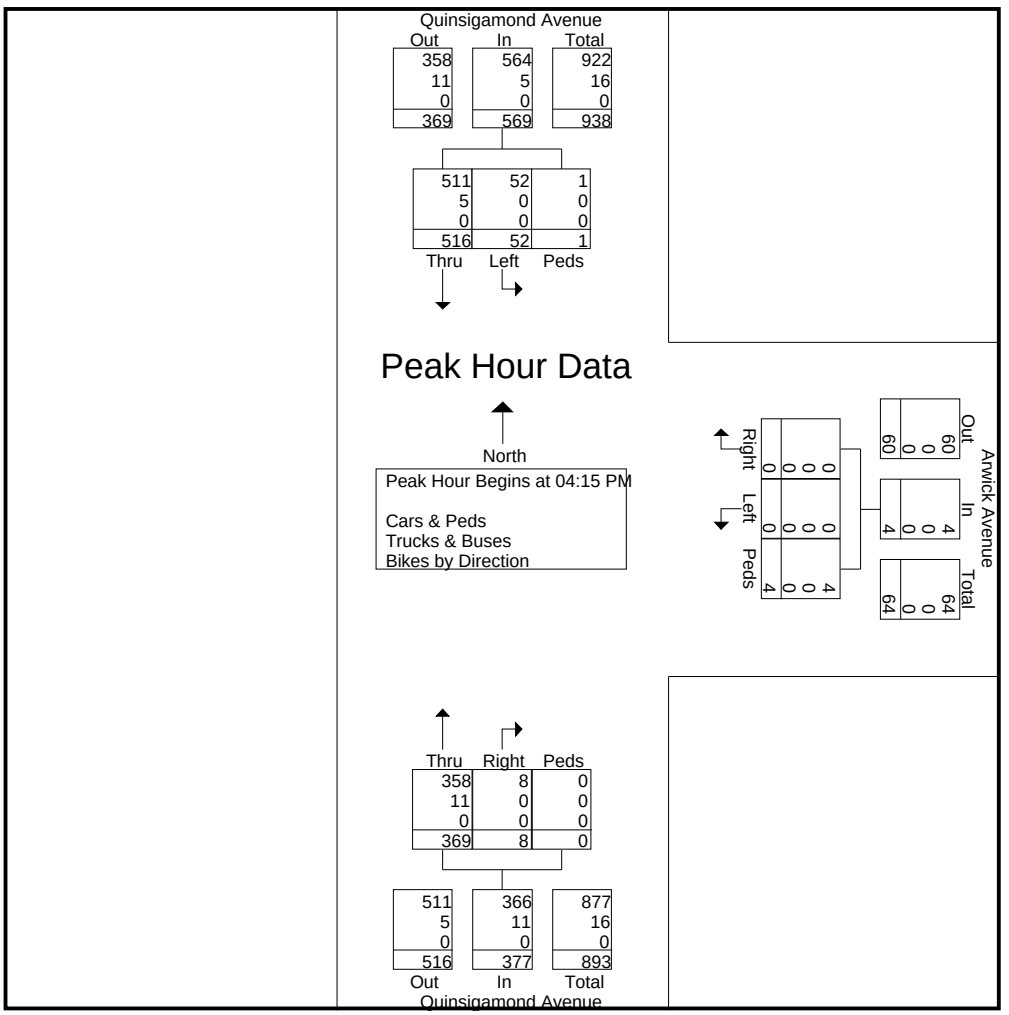
	Quinsigamond Avenue From North				Arwick Avenue From East				Quinsigamond Avenue From South				
Start Time	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Right	Thru	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	**149**	**15**	0	**164**	0	0	**4**	**4**	1	**105**	0	**106**	**274**
04:30 PM	128	11	**1**	140	0	0	0	0	1	103	0	104	244
04:45 PM	103	12	0	115	0	0	0	0	2	71	0	73	188
05:00 PM	136	14	0	150	0	0	0	0	**4**	90	0	94	244
Total Volume	516	52	1	569	0	0	4	4	8	369	0	377	950
% App. Total	90.7	9.1	0.2		0	0	100		2.1	97.9	0		
PHF	.866	.867	.250	.867	.000	.000	.250	.250	.500	.879	.000	.889	.867
Cars & Peds	511	52	1	564	0	0	4	4	8	358	0	366	934
% Cars & Peds	99.0	100	100	99.1	0	0	100	100	100	97.0	0	97.1	98.3
Trucks & Buses	5	0	0	5	0	0	0	0	0	11	0	11	16
% Trucks & Buses	1.0	0	0	0.9	0	0	0	0	0	3.0	0	2.9	1.7
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0



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N/S: Harding Street/Millbury Street
W: Arwick Avenue
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407C
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	0	16	1	24	0	0	0	6	0	47
07:15 AM	0	18	4	30	0	0	1	8	0	61
07:30 AM	0	25	2	30	0	0	2	9	0	68
07:45 AM	0	18	1	56	0	0	0	11	0	86
Total	0	77	8	140	0	0	3	34	0	262
08:00 AM	0	24	2	43	0	0	1	17	0	87
08:15 AM	0	32	1	37	0	0	1	16	1	88
08:30 AM	0	13	3	59	0	0	1	21	0	97
08:45 AM	0	25	2	55	0	0	0	21	0	103
Total	0	94	8	194	0	0	3	75	1	375
Grand Total	0	171	16	334	0	0	6	109	1	637
Apprch %	0	91.4	8.6	100	0	0	5.2	94	0.9	
Total %	0	26.8	2.5	52.4	0	0	0.9	17.1	0.2	
Cars & Peds	0	161	13	329	0	0	6	106	1	616
% Cars & Peds	0	94.2	81.2	98.5	0	0	100	97.2	100	96.7
Trucks & Buses	0	10	3	5	0	0	0	3	0	21
% Trucks & Buses	0	5.8	18.8	1.5	0	0	0	2.8	0	3.3
Bikes by Direction	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	0	24	2	26	43	0	0	43	**1**	17	0	18	87
08:15 AM	0	**32**	1	**33**	37	0	0	37	1	16	**1**	18	88
08:30 AM	0	13	**3**	16	**59**	0	0	**59**	1	**21**	0	**22**	97
08:45 AM	0	25	2	27	55	0	0	55	0	21	0	21	**103**
Total Volume	0	94	8	102	194	0	0	194	3	75	1	79	375
% App. Total	0	92.2	7.8		100	0	0		3.8	94.9	1.3		
PHF	.000	.734	.667	.773	.822	.000	.000	.822	.750	.893	.250	.898	.910
Cars & Peds	0	88	6	94	191	0	0	191	3	74	1	78	363
% Cars & Peds	0	93.6	75.0	92.2	98.5	0	0	98.5	100	98.7	100	98.7	96.8
Trucks & Buses	0	6	2	8	3	0	0	3	0	1	0	1	12
% Trucks & Buses	0	6.4	25.0	7.8	1.5	0	0	1.5	0	1.3	0	1.3	3.2
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0

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Client: McM/Leina Xu

File Name : 05407C
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Cars & Peds

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	0	14	1	24	0	0	0	6	0	45
07:15 AM	0	18	3	30	0	0	1	7	0	59
07:30 AM	0	24	2	29	0	0	2	9	0	66
07:45 AM	0	17	1	55	0	0	0	10	0	83
Total	0	73	7	138	0	0	3	32	0	253
08:00 AM	0	22	2	42	0	0	1	17	0	84
08:15 AM	0	30	1	36	0	0	1	16	1	85
08:30 AM	0	12	1	58	0	0	1	20	0	92
08:45 AM	0	24	2	55	0	0	0	21	0	102
Total	0	88	6	191	0	0	3	74	1	363
Grand Total	0	161	13	329	0	0	6	106	1	616
Apprch %	0	92.5	7.5	100	0	0	5.3	93.8	0.9	
Total %	0	26.1	2.1	53.4	0	0	1	17.2	0.2	

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	0	22	**2**	24	42	0	0	42	**1**	17	0	18	84
08:15 AM	0	**30**	1	**31**	36	0	0	36	1	16	**1**	18	85
08:30 AM	0	12	1	13	**58**	0	0	**58**	1	20	0	**21**	92
08:45 AM	0	24	2	26	55	0	0	55	0	**21**	0	21	**102**
Total Volume	0	88	6	94	191	0	0	191	3	74	1	78	363
% App. Total	0	93.6	6.4		100	0	0		3.8	94.9	1.3		
PHF	.000	.733	.750	.758	.823	.000	.000	.823	.750	.881	.250	.929	.890

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File Name : 05407C
Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Trucks & Buses

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	0	2	0	0	0	0	0	0	0	2
07:15 AM	0	0	1	0	0	0	0	1	0	2
07:30 AM	0	1	0	1	0	0	0	0	0	2
07:45 AM	0	1	0	1	0	0	0	1	0	3
Total	0	4	1	2	0	0	0	2	0	9
08:00 AM	0	2	0	1	0	0	0	0	0	3
08:15 AM	0	2	0	1	0	0	0	0	0	3
08:30 AM	0	1	2	1	0	0	0	1	0	5
08:45 AM	0	1	0	0	0	0	0	0	0	1
Total	0	6	2	3	0	0	0	1	0	12
Grand Total	0	10	3	5	0	0	0	3	0	21
Apprch %	0	76.9	23.1	100	0	0	0	100	0	
Total %	0	47.6	14.3	23.8	0	0	0	14.3	0	

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:45 AM													
07:45 AM	0	1	0	1	**1**	0	0	**1**	0	**1**	0	**1**	3
08:00 AM	0	**2**	0	2	1	0	0	1	0	0	0	0	3
08:15 AM	0	2	0	2	1	0	0	1	0	0	0	0	3
08:30 AM	0	1	**2**	**3**	1	0	0	1	0	1	0	1	**5**
Total Volume	0	6	2	8	4	0	0	4	0	2	0	2	14
% App. Total	0	75	25		100	0	0		0	100	0		
PHF	.000	.750	.250	.667	1.00	.000	.000	1.00	.000	.500	.000	.500	.700

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Site Code : Y2118711
Start Date : 4/8/2021

Groups Printed- Bikes by Direction

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0	0	0	0	0	0	
Total %										

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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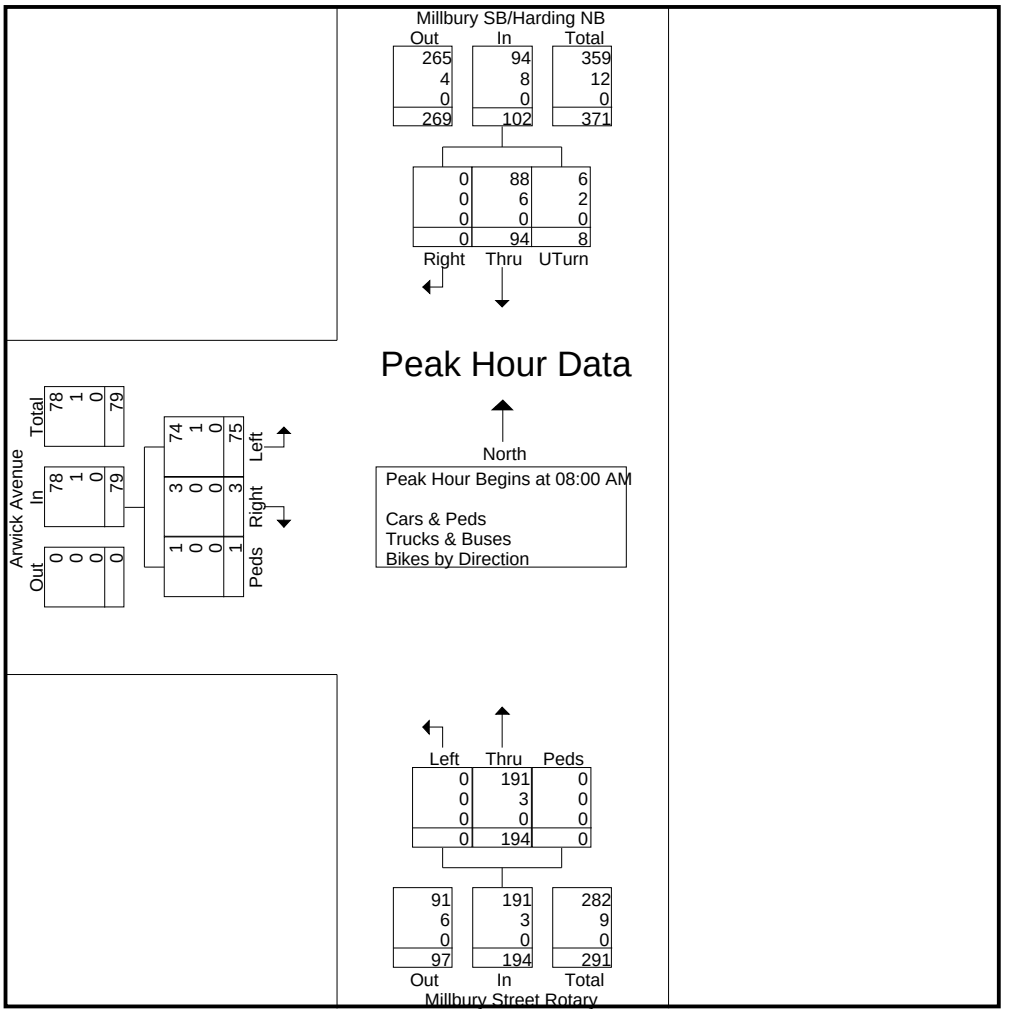
Page No : 1

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 08:00 AM													
08:00 AM	0	24	2	26	43	0	0	43	**1**	17	0	18	87
08:15 AM	0	**32**	1	**33**	37	0	0	37	1	16	**1**	18	88
08:30 AM	0	13	**3**	16	**59**	0	0	**59**	1	**21**	0	**22**	97
08:45 AM	0	25	2	27	55	0	0	55	0	21	0	21	**103**
Total Volume	0	94	8	102	194	0	0	194	3	75	1	79	375
% App. Total	0	92.2	7.8		100	0	0		3.8	94.9	1.3		
PHF	.000	.734	.667	.773	.822	.000	.000	.822	.750	.893	.250	.898	.910
Cars & Peds	0	88	6	94	191	0	0	191	3	74	1	78	363
% Cars & Peds	0	93.6	75.0	92.2	98.5	0	0	98.5	100	98.7	100	98.7	96.8
Trucks & Buses	0	6	2	8	3	0	0	3	0	1	0	1	12
% Trucks & Buses	0	6.4	25.0	7.8	1.5	0	0	1.5	0	1.3	0	1.3	3.2
Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bikes by Direction	0	0	0	0	0	0	0	0	0	0	0	0	0



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Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds - Trucks & Buses - Bikes by Direction

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
04:00 PM	0	28	3	65	0	0	1	8	0	105
04:15 PM	0	37	3	49	0	0	2	14	0	105
04:30 PM	0	32	2	57	0	0	0	11	1	103
04:45 PM	0	36	3	66	0	0	0	15	0	120
Total	0	133	11	237	0	0	3	48	1	433
05:00 PM	0	33	4	52	0	0	1	16	0	106
05:15 PM	0	26	1	57	0	1	0	12	0	97
05:30 PM	0	29	3	50	0	0	2	10	1	95
05:45 PM	0	33	3	44	0	0	1	13	0	94
Total	0	121	11	203	0	1	4	51	1	392
Grand Total	0	254	22	440	0	1	7	99	2	825
Apprch %	0	92	8	99.8	0	0.2	6.5	91.7	1.9	
Total %	0	30.8	2.7	53.3	0	0.1	0.8	12	0.2	
Cars & Peds	0	250	19	433	0	1	7	99	2	811
% Cars & Peds	0	98.4	86.4	98.4	0	100	100	100	100	98.3
Trucks & Buses	0	3	3	5	0	0	0	0	0	11
% Trucks & Buses	0	1.2	13.6	1.1	0	0	0	0	0	1.3
Bikes by Direction	0	1	0	2	0	0	0	0	0	3
% Bikes by Direction	0	0.4	0	0.5	0	0	0	0	0	0.4

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	0	**37**	3	**40**	49	0	0	49	**2**	14	0	16	105
04:30 PM	0	32	2	34	57	0	0	57	0	11	**1**	12	103
04:45 PM	0	36	3	39	**66**	0	0	**66**	0	15	0	15	**120**
05:00 PM	0	33	**4**	37	52	0	0	52	1	**16**	0	**17**	106
Total Volume	0	138	12	150	224	0	0	224	3	56	1	60	434
% App. Total	0	92	8		100	0	0		5	93.3	1.7		
PHF	.000	.932	.750	.938	.848	.000	.000	.848	.375	.875	.250	.882	.904
Cars & Peds	0	137	11	148	220	0	0	220	3	56	1	60	428
% Cars & Peds	0	99.3	91.7	98.7	98.2	0	0	98.2	100	100	100	100	98.6
Trucks & Buses	0	1	1	2	3	0	0	3	0	0	0	0	5
% Trucks & Buses	0	0.7	8.3	1.3	1.3	0	0	1.3	0	0	0	0	1.2
Bikes by Direction	0	0	0	0	1	0	0	1	0	0	0	0	1
% Bikes by Direction	0	0	0	0	0.4	0	0	0.4	0	0	0	0	0.2

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Groups Printed- Cars & Peds

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
04:00 PM	0	28	1	65	0	0	1	8	0	103
04:15 PM	0	37	3	49	0	0	2	14	0	105
04:30 PM	0	32	2	55	0	0	0	11	1	101
04:45 PM	0	36	3	64	0	0	0	15	0	118
Total	0	133	9	233	0	0	3	48	1	427
05:00 PM	0	32	3	52	0	0	1	16	0	104
05:15 PM	0	26	1	56	0	1	0	12	0	96
05:30 PM	0	27	3	50	0	0	2	10	1	93
05:45 PM	0	32	3	42	0	0	1	13	0	91
Total	0	117	10	200	0	1	4	51	1	384
Grand Total	0	250	19	433	0	1	7	99	2	811
Apprch %	0	92.9	7.1	99.8	0	0.2	6.5	91.7	1.9	
Total %	0	30.8	2.3	53.4	0	0.1	0.9	12.2	0.2	

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	0	**37**	**3**	**40**	49	0	0	49	**2**	14	0	16	105
04:30 PM	0	32	2	34	55	0	0	55	0	11	**1**	12	101
04:45 PM	0	36	3	39	**64**	0	0	**64**	0	15	0	15	**118**
05:00 PM	0	32	3	35	52	0	0	52	1	**16**	0	**17**	104
Total Volume	0	137	11	148	220	0	0	220	3	56	1	60	428
% App. Total	0	92.6	7.4		100	0	0		5	93.3	1.7		
PHF	.000	.926	.917	.925	.859	.000	.000	.859	.375	.875	.250	.882	.907

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Page No : 1

Groups Printed- Trucks & Buses

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
04:00 PM	0	0	2	0	0	0	0	0	0	2
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	1	0	0	0	0	0	1
04:45 PM	0	0	0	2	0	0	0	0	0	2
Total	0	0	2	3	0	0	0	0	0	5
05:00 PM	0	1	1	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	1	0	0	0	0	0	0	0	1
05:45 PM	0	1	0	2	0	0	0	0	0	3
Total	0	3	1	2	0	0	0	0	0	6
Grand Total	0	3	3	5	0	0	0	0	0	11
Apprch %	0	50	50	100	0	0	0	0	0	
Total %	0	27.3	27.3	45.5	0	0	0	0	0	

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	**1**	**1**	**2**	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	1	0	1	0	0	0	0	0	0	0	0	1
05:45 PM	0	1	0	1	**2**	0	0	**2**	0	0	0	0	**3**
Total Volume	0	3	1	4	2	0	0	2	0	0	0	0	6
% App. Total	0	75	25		100	0	0		0	0	0		
PHF	.000	.750	.250	.500	.250	.000	.000	.250	.000	.000	.000	.000	.500

Transportation Data Corporation

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N/S: Harding Street/Millbury Street
W: Arwick Avenue
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407CC
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Bikes by Direction

	Millbury SB/Harding NB From North			Millbury Street Rotary From South			Arwick Avenue From West			
Start Time	Right	Thru	UTurn	Thru	Left	Peds	Right	Left	Peds	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	1	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	0	0	0	0	0	1
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	1	0	0	0	0	0	1
05:30 PM	0	1	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	1	0	1	0	0	0	0	0	2
Grand Total	0	1	0	2	0	0	0	0	0	3
Apprch %	0	100	0	100	0	0	0	0	0	
Total %	0	33.3	0	66.7	0	0	0	0	0	

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:30 PM													
04:30 PM	0	0	0	0	**1**	0	0	**1**	0	0	0	0	**1**
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
Total Volume	0	0	0	0	2	0	0	2	0	0	0	0	2
% App. Total	0	0	0		100	0	0		0	0	0		
PHF	.000	.000	.000	.000	.500	.000	.000	.500	.000	.000	.000	.000	.500

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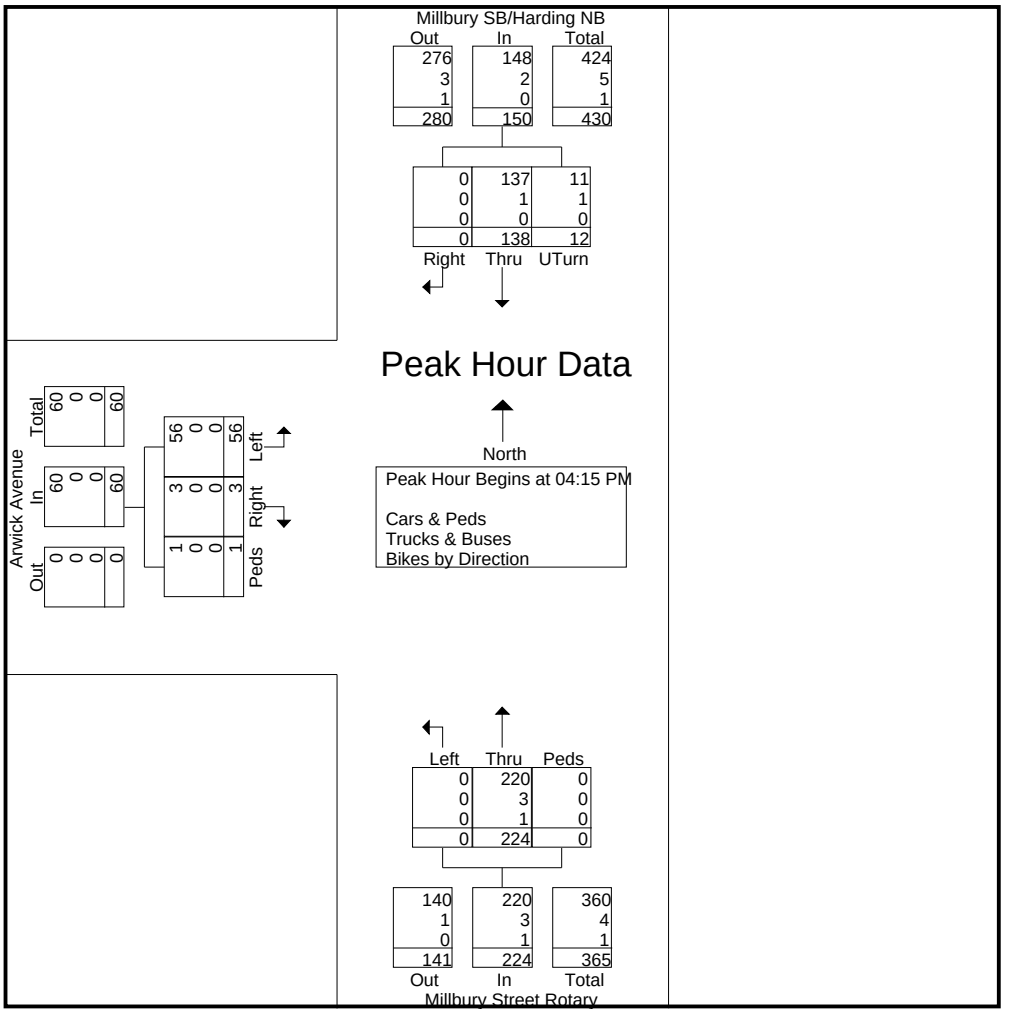
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407CC
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

	Millbury SB/Harding NB From North				Millbury Street Rotary From South				Arwick Avenue From West				
Start Time	Right	Thru	UTurn	App. Total	Thru	Left	Peds	App. Total	Right	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:15 PM													
04:15 PM	0	**37**	3	**40**	49	0	0	49	**2**	14	0	16	105
04:30 PM	0	32	2	34	57	0	0	57	0	11	**1**	12	103
04:45 PM	0	36	3	39	**66**	0	0	**66**	0	15	0	15	**120**
05:00 PM	0	33	**4**	37	52	0	0	52	1	**16**	0	**17**	106
Total Volume	0	138	12	150	224	0	0	224	3	56	1	60	434
% App. Total	0	92	8		100	0	0		5	93.3	1.7		
PHF	.000	.932	.750	.938	.848	.000	.000	.848	.375	.875	.250	.882	.904
Cars & Peds	0	137	11	148	220	0	0	220	3	56	1	60	428
% Cars & Peds	0	99.3	91.7	98.7	98.2	0	0	98.2	100	100	100	100	98.6
Trucks & Buses	0	1	1	2	3	0	0	3	0	0	0	0	5
% Trucks & Buses	0	0.7	8.3	1.3	1.3	0	0	1.3	0	0	0	0	1.2
Bikes by Direction	0	0	0	0	1	0	0	1	0	0	0	0	1
% Bikes by Direction	0	0	0	0	0.4	0	0	0.4	0	0	0	0	0.2



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N/S: Millbury Street
W: Haddad Auto Rear Driveway
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407D
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds

	Millbury Sreet From North			Millbury Street From South			Haddad Auto Rear Driveway From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	In	Out	Peds	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	1	1	0	2
07:30 AM	0	0	0	0	0	0	1	0	0	1
07:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	2	1	0	3
08:00 AM	0	0	0	0	0	0	1	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	1	1	0	2
08:45 AM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	2	1	0	3
Grand Total	0	0	0	0	0	0	4	2	0	6
Apprch %	0	0	0	0	0	0	66.7	33.3	0	
Total %	0	0	0	0	0	0	66.7	33.3	0	

	Millbury Sreet From North				Millbury Street From South				Haddad Auto Rear Driveway From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	In	Out	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	0	0	0	0	0	0	**1**	**1**	0	**2**	**2**
07:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	3	1	0	4	4
% App. Total	0	0	0		0	0	0		75	25	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.750	.250	.000	.500	.500

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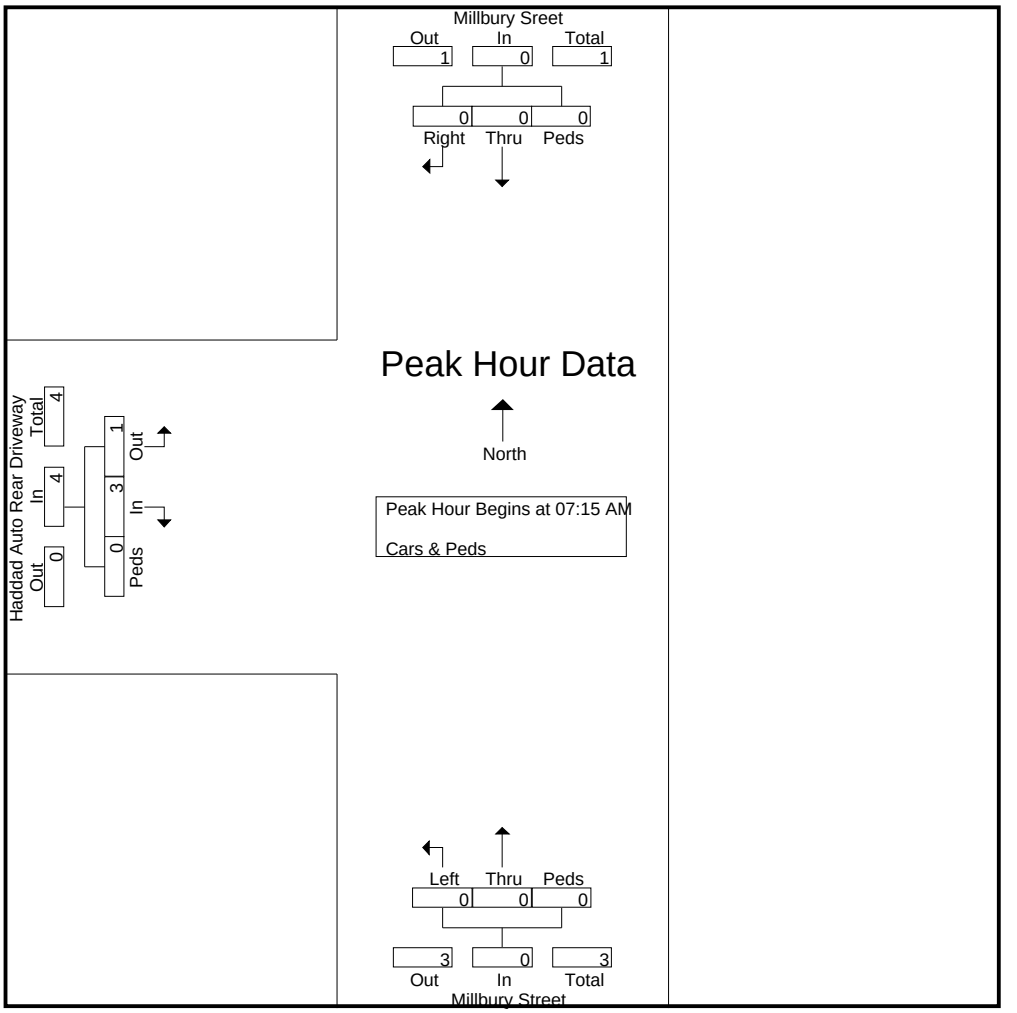
N/S: Millbury Street
W: Haddad Auto Rear Driveway
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407D
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

	Millbury Sreet From North				Millbury Street From South				Haddad Auto Rear Driveway From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	In	Out	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:15 AM													
07:15 AM	0	0	0	0	0	0	0	0	**1**	**1**	0	**2**	**2**
07:30 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	3	1	0	4	4
% App. Total	0	0	0		0	0	0		75	25	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.750	.250	.000	.500	.500



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N/S: Millbury Street
W: Haddad Auto Rear Driveway
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407DD
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

Groups Printed- Cars & Peds

	Millbury Sreet From North			Millbury Street From South			Haddad Auto Rear Driveway From West			
Start Time	Right	Thru	Peds	Thru	Left	Peds	In	Out	Peds	Int. Total
04:00 PM	0	0	0	0	0	0	0	1	0	1
04:15 PM	0	0	0	0	0	0	0	1	0	1
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	2	0	2
05:00 PM	0	0	0	0	0	0	0	1	0	1
05:15 PM	0	0	0	0	0	0	1	0	0	1
05:30 PM	0	0	0	0	0	0	2	0	0	2
05:45 PM	0	0	0	0	0	0	1	0	0	1
Total	0	0	0	0	0	0	4	1	0	5
Grand Total	0	0	0	0	0	0	4	3	0	7
Apprch %	0	0	0	0	0	0	57.1	42.9	0	
Total %	0	0	0	0	0	0	57.1	42.9	0	

	Millbury Sreet From North				Millbury Street From South				Haddad Auto Rear Driveway From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	In	Out	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	0	0	0	0	0	0	0	0	**1**	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
05:30 PM	0	0	0	0	0	0	0	0	**2**	0	0	**2**	**2**
05:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	4	1	0	5	5
% App. Total	0	0	0		0	0	0		80	20	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.250	.000	.625	.625

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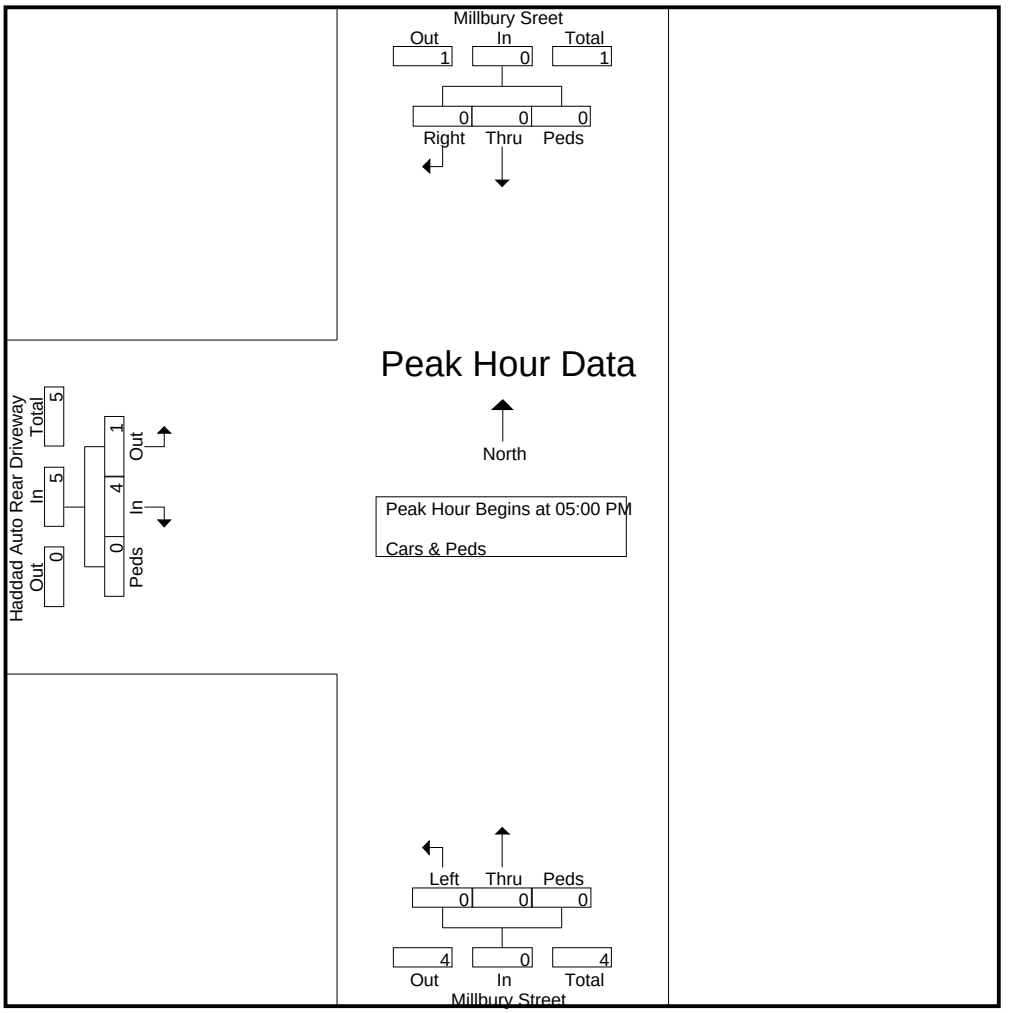
N/S: Millbury Street
W: Haddad Auto Rear Driveway
City, State: Worcester, MA
Client: McM/Leina Xu

File Name : 05407DD
Site Code : Y2118711
Start Date : 4/8/2021
Page No : 1

	Millbury Sreet From North				Millbury Street From South				Haddad Auto Rear Driveway From West				
Start Time	Right	Thru	Peds	App. Total	Thru	Left	Peds	App. Total	In	Out	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 05:00 PM													
05:00 PM	0	0	0	0	0	0	0	0	0	**1**	0	1	1
05:15 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
05:30 PM	0	0	0	0	0	0	0	0	**2**	0	0	**2**	**2**
05:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total Volume	0	0	0	0	0	0	0	0	4	1	0	5	5
% App. Total	0	0	0		0	0	0		80	20	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.500	.250	.000	.625	.625



APPENDIX B
Traffic Projection Model

TRAFFIC PROJECTION MODEL

Weekday Morning Peak Hour
Convenience Store & Gas Station
Worcester, MA

Intersection	Dir.	Turn	2021 Counted Volumes	COVID-19 Adjustment	Polar Park Trips	Balancing Volumes	2021 Existing Volumes	Background Growth 7 Years 0.25%	2028 No-Build Volumes	Arwick Two-Way Rerouting	New Project PERCENT ENTER	New Project Trips ENTER	New Project PERCENT EXIT	New Project Trips EXIT	New Project Trips TOTAL	Project Pass-by Trips	2028 Build Volumes
Quinsigamond Avenue at	EB	L	46	9	6	1	62	1	63		15%	9		0	9	35	107
Millbury Street/Cambridge Street		T	128	26	0	1	155	3	158		10%	6		0	6	2	166
		R	320	64	0		384	7	391			0		0	0	-37	354
	WB	L	11	2	0	0	13	0	13	0		0	25%	15	15	39	67
		T	73	15	0	3	91	2	93	-1		0	15%	9	9	22	123
		R	4	1	0	1	6	0	6			0		0	0	0	6
	NB	L	270	54	0		324	6	330			0		0	0	-31	299
		T	498	100	39	10	647	11	658		35%	22		0	22	17	697
		R	59	12	0	1	72	1	73		5%	3		0	3	14	90
	SB	L	5	1	0	0	6	0	6			0		0	0	0	6
		T	165	33	22	1	221	4	225	1		0	15%	9	9	-2	233
		R	53	11	0	0	64	1	65	0		0	10%	6	6	9	80
Quinsigamond Avenue at	NB	T	548	110	45	12	715	12	727			0		0	0	-62	665
South Site Driveway		R	0	0			0	0	0		50%	31		0	31	114	145
	SB	T	223	45	22	1	291	5	296	1		0	25%	15	15	7	319
Quinsigamond Avenue at	WB	R	0	0			0	0	0			0	20%	12	12	56	68
North Site Driveway	NB	T	548	110	45	12	715	12	727			0		0	0	-62	665
	SB	T	223	45	22	1	291	5	296	1		0	25%	15	15	7	319
Quinsigamond Avenue at	WB	L	0				0	0	0	1		0	25%	15	15	32	48
Arwick Avenue		R	0				0	0	0	2		0	5%	4	4	6	12
	NB	T	557	111	45		713	12	725			0	20%	12	12	-6	731
		R	2	0			2	0	2			0		0	0	0	2
	SB	L	68	14			82	1	83		25%	15		0	15	25	123
		T	224	45	22		291	5	296			0		0	0	-25	271
Arwick Avenue at	EB	T	70	14			84	1	85			0		0	0	-7	78
Site Driveway		R	0	0			0	0	0		25%	15		0	15	32	47
	WB	L	0				0	0	0		5%	3		0	3	3	6
		T	0				0	0	0	3		0		0	0	0	3
	NB	L	0	0			0		0			0	30%	19	19	38	57
		R	0	0			0	0	0			0	5%	3	3	15	18
Millbury Street at	EB	L	1	0			1	0	1			0	5%	3	3	14	18
Hadadd Auto/Site Driveway		R	2	0			2	0	2			0	40%	24	24	70	96
	NB	L	0	0			0	0	0		15%	9		0	9	38	47
		T	192	39		2	233	4	237			0		0	0	-22	215
	SB	T	86	18		4	108	2	110	-1		0		0	0	-9	100
		R	0	0			0	0	0		5%	3		0	3	6	9

Peak Hour: 7:45 AM - 8:45 AM

TRAFFIC PROJECTION MODEL

Weekday Afternoon Peak Hour
Convenience Store & Gas Station
Worcester, MA

Intersection	Dir.	Turn	2021 Counted Volumes	COVID-19 Adjustment	Polar Park Trips	Balancing Volumes	2021 Existing Volumes	Background Growth 7 Years 0.25%	2028 No-Build Volumes	Arwick Two-Way Rerouting	New Project PERCENT ENTER	New Project Trips ENTER	New Project PERCENT EXIT	New Project Trips EXIT	New Project Trips TOTAL	Project Pass-by Trips	2028 Build Volumes
Quinsigamond Avenue at	EB	L	26	1	7		34	1	35		15%	7		0	7	28	70
Millbury Street/Cambridge Street		T	191	10	0	1	202	3	205		10%	5		0	5	-2	208
		R	341	17	0		358	6	364			0		0	0	-26	338
	WB	L	33	2	0		35	1	36	0		0	25%	12	12	41	89
		T	108	5	0		113	2	115	-1		0	15%	7	7	18	139
		R	1	0	0		1	0	1			0		0	0	0	1
	NB	L	318	16	0		334	6	340			0		0	0	-24	316
		T	350	18	33		401	7	408		35%	17		0	17	15	440
		R	28	1	0		29	1	30		5%	2		0	2	9	41
	SB	L	2	0	0		2	0	2			0		0	0	4	6
		T	427	21	45		493	9	502	1		0	15%	7	7	-14	496
		R	90	5	10		105	2	107	0		0	10%	5	5	5	117
Quinsigamond Avenue at	NB	T	377	19	40	0	436	8	444			0		0	0	-28	416
South Site Driveway		R	0	0			0	0	0		50%	24		0	24	71	95
	SB	T	519	26	55	0	600	11	611	1		0	25%	12	12	-5	619
Quinsigamond Avenue at	WB	R	0	0			0	0	0			0	20%	10	10	26	36
North Site Driveway	NB	T	377	19	40	0	436	8	444			0		0	0	-28	416
	SB	T	519	26	55	0	600	11	611	1		0	25%	12	12	-5	619
Quinsigamond Avenue at	WB	L	0				0	0	0	1		0	25%	12	12	30	43
Arwick Avenue		R	0				0	0	0	2		0	5%	2	2	2	6
	NB	T	369	18	40	1	428	8	436			0	20%	10	10	-2	444
		R	8	0			8	0	8			0		0	0	0	8
	SB	L	52	3			55	1	56		25%	12		0	12	35	103
		T	516	26	55	3	600	11	611			0		0	0	-35	576
Arwick Avenue at	EB	T	60	3			63	1	64			0		0	0	-4	60
Site Driveway		R	0	0			0	0	0		25%	12		0	12	39	51
	WB	L	0				0	0	0		5%	2		0	2	3	5
		T	0				0	0	0	3		0		0	0	0	3
	NB	L	0	0			0		0			0	30%	14	14	32	46
		R	0	0			0	0	0			0	5%	2	2	10	12
Millbury Street at	EB	L	2	0			2	0	2			0	5%	2	2	11	15
Hadadd Auto/Site Driveway		R	0	0			0	0	0			0	40%	19	19	69	88
	NB	L	0	0			0	0	0		15%	7		0	7	28	35
		T	221	11		1	233	4	237			0		0	0	-17	220
	SB	T	142	7		0	149	3	152	-1		0		0	0	-10	141
		R	0	0			0	0	0		5%	2		0	2	7	9

Peak Hour: 4:15 PM - 5:15 PM

APPENDIX C
Crash Summary

CRASH ANALYSIS

Convenience Store & Gas Station
Worcester, MA

	Quinsigamond Ave at Millbury St/ Cambridge St	Quinsigamond Ave at Arwick Ave
Year		
2014	5	0
2015	4	0
2016	5	0
2017	15	1
2018	7	1
Type		
Angle	9	1
Rear-end	17	0
Sideswipe	2	0
Head-on	0	0
Single Vehicle	7	1
Unknown	1	0
Severity		
Property Damage	19	2
Personal Injury	12	0
Fatality	0	0
Unknown	5	0
Weather		
Clear	22	1
Cloudy	6	1
Rain	4	0
Snow	3	0
Unknown	1	0
Road Surface		
Dry	24	2
Wet	6	0
Ice	1	0
Snow	2	0
Dirt, oil, gravel	1	0
Other	1	0
Unknown	1	0
Time		
7:00 AM to 9:00 AM	2	0
9:00 AM to 4:00 PM	15	2
4:00 PM to 6:00 PM	5	0
6:00 PM to 7:00 AM	14	0
Total	**36**	**2**
Crash Rate	0.91	0.10
State Average	0.78	0.57
District 3 Average	0.89	0.61

Source: MassDOT

APPENDIX D

Highway Capacity Manual Methodologies

CAPACITY/LEVEL-OF-SERVICE ANALYSES METHODOLOGY

The detailed capacity/level-of-service analysis contained in this traffic impact study was performed in accordance with the standard techniques contained in the *Highway Capacity Manual*.(1) By definition, capacity represents "the maximum rate of flow that can reasonably be expected to pass a point on a uniform section of a lane or roadway under prevailing roadway, traffic, and control conditions." The level of functioning of an intersection or a uniform section of a lane or roadway can be expressed in terms of levels of service. Level of service (LOS) is defined as "a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers". Such measures include "speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety."

At unsignalized intersections, a methodology for evaluating the relative functioning of intersections controlled by stop or yield signs has been developed, and is based on several assumptions, including:

- Major street flows are not affected by the minor (stop-sign controlled) street movements.
- Left turns from the major street to the minor street are influenced only by opposing major street through flow.
- Minor street left turns are impeded by all major street traffic plus opposing minor street traffic.
- Minor street through traffic is impeded by all major street traffic.
- Minor street right turns are impeded only by the major street traffic coming from the left.

The concept of stop-controlled or yield-controlled intersection analysis is based on the estimate of average total delay on minor streets. The methodology of analysis relies on three elements: the size and distribution of gaps in the major traffic stream, the usefulness of these gaps to the minor stream drivers, and the relative priority of the various traffic streams at the intersection. The results of the analysis provide an estimate of average total delay for the various critical movements at the unsignalized intersections. Correlation between average total delay and the respective levels of service are provided for unsignalized intersections as follows:

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(1) *Transportation Research Board, Highway Capacity Manual, 6th Edition, published by the Transportation Research Board, Washington, DC, 2016.*

Unsignalized Intersections

Level of Service	Control Delay Per Vehicle (seconds)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F	> 50

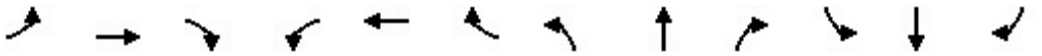
At signalized intersections, an additional element must be considered: time allocation. Level of service is based on the average control delay per vehicle for various movements within the intersection. Volume/capacity relationships also affect the operations of signalized intersections. Thus, both volume/capacity and delay must be considered to evaluate the overall operation of a signalized intersection. Correlation between average delay per vehicle and the respective levels of service are provided for signalized intersections as follows:

Signalized Intersections

Level of Service	Control Delay Per Vehicle (seconds)
A	$\leq$ 10
B	>10 – 20
C	>20 – 35
D	>35 – 55
E	>55 – 80
F	> 80

APPENDIX E

2021 Existing Capacity/Level-of-Service Analysis



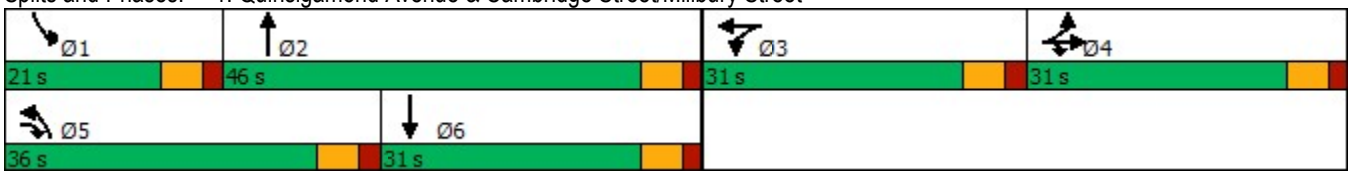
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	155	384	13	91	6	324	647	72	6	221	64
Future Volume (vph)	62	155	384	13	91	6	324	647	72	6	221	64
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1826	1583	0	1751	0	1770	3426	0	1805	3353	0
Flt Permitted		0.986			0.994		0.950			0.950		
Satd. Flow (perm)	0	1826	1583	0	1751	0	1770	3426	0	1805	3353	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			404		2			9			26	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.71	0.71	0.71	0.91	0.91	0.91	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	2%	2%	0%	7%	25%	2%	4%	2%	0%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	228	404	0	154	0	356	790	0	8	370	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		17.1	47.7		13.5		24.4	43.7		6.3	14.9	
Actuated g/C Ratio		0.18	0.50		0.14		0.26	0.46		0.07	0.16	
v/c Ratio		0.70	0.41		0.62		0.79	0.50		0.07	0.68	
Control Delay		50.7	2.8		52.4		48.5	21.0		52.7	43.7	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		50.7	2.8		52.4		48.5	21.0		52.7	43.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		D	C		D	D	
Approach Delay		20.1			52.4			29.5			43.9	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)		132	0		89		199	161		5	106	
Queue Length 95th (ft)		249	50		137		#413	326		19	152	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		503	1079		484		585	1684		298	943	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.45	0.37		0.32		0.61	0.47		0.03	0.39	

Intersection Summary

Area Type: Other
Cycle Length: 129
Actuated Cycle Length: 95
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 30.8 Intersection LOS: C
Intersection Capacity Utilization 59.4% ICU Level of Service B
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	713	2	82	291
Future Vol, veh/h	0	0	713	2	82	291
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	96	96
Heavy Vehicles, %	2	2	4	0	3	4
Mvmt Flow	0	0	784	2	85	303

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1107	-	0	0	786	0
Stage 1	785	-	-	-	-	-
Stage 2	322	-	-	-	-	-
Critical Hdwy	6.84	-	-	-	4.16	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	-	-	-	2.23	-
Pot Cap-1 Maneuver	204	0	-	-	822	-
Stage 1	410	0	-	-	-	-
Stage 2	707	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	179	-	-	-	822	-
Mov Cap-2 Maneuver	179	-	-	-	-	-
Stage 1	410	-	-	-	-	-
Stage 2	619	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	2.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	822	-
HCM Lane V/C Ratio	-	-	-	0.104	-
HCM Control Delay (s)	-	-	0	9.9	0.4
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.3	-

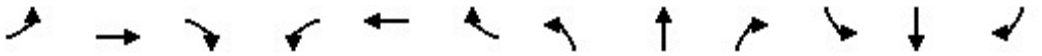
Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	2	0	233	108	0
Future Vol, veh/h	1	2	0	233	108	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	84	84	69	69
Heavy Vehicles, %	2	2	2	2	7	2
Mvmt Flow	3	5	0	277	157	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	434	157	157	0	-	0
Stage 1	157	-	-	-	-	-
Stage 2	277	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	579	889	1423	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	770	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	579	889	1423	-	-	-
Mov Cap-2 Maneuver	579	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	770	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1423	-	754	-	-
HCM Lane V/C Ratio	-	-	0.01	-	-
HCM Control Delay (s)	0	-	9.8	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-



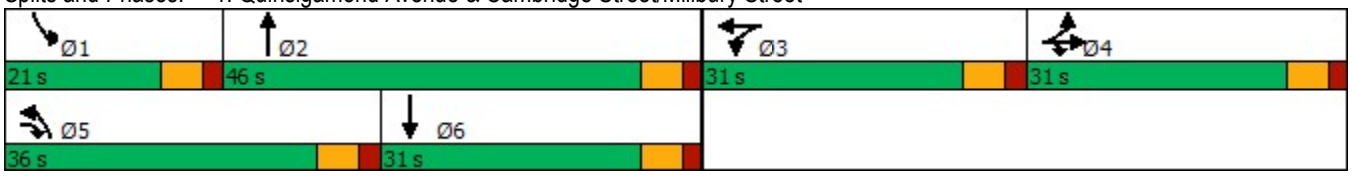
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	202	358	35	113	1	334	401	29	2	493	105
Future Volume (vph)	34	202	358	35	113	1	334	401	29	2	493	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1855	1599	0	1863	0	1770	3477	0	1805	3468	0
Flt Permitted		0.993			0.989		0.950			0.950		
Satd. Flow (perm)	0	1855	1599	0	1863	0	1770	3477	0	1805	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			398					6			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.90	0.90	0.90	0.96	0.96	0.96	0.92	0.92	0.92	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	2%	3%	0%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	262	398	0	155	0	363	468	0	2	704	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		19.7	52.2		13.7		26.3	55.7		6.1	25.4	
Actuated g/C Ratio		0.18	0.48		0.12		0.24	0.51		0.06	0.23	
v/c Ratio		0.78	0.41		0.67		0.85	0.26		0.02	0.86	
Control Delay		61.1	3.0		61.8		60.7	17.6		56.0	53.3	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		61.1	3.0		61.8		60.7	17.6		56.0	53.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A		E		E	B		E	D	
Approach Delay		26.1			61.8			36.4			53.3	
Approach LOS		C			E			D			D	
Queue Length 50th (ft)		184	0		111		249	92		1	262	
Queue Length 95th (ft)		294	52		187		#442	178		10	#383	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		430	1010		432		492	1771		251	817	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.61	0.39		0.36		0.74	0.26		0.01	0.86	

Intersection Summary

Area Type: Other
Cycle Length: 129
Actuated Cycle Length: 109.6
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 40.2 Intersection LOS: D
Intersection Capacity Utilization 75.9% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	428	8	55	600
Future Vol, veh/h	0	0	428	8	55	600
Conflicting Peds, #/hr	0	0	0	0	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	89	89	87	87
Heavy Vehicles, %	0	0	3	0	0	1
Mvmt Flow	0	0	481	9	63	690

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	961	-	0	0	494	0
Stage 1	490	-	-	-	-	-
Stage 2	471	-	-	-	-	-
Critical Hdwy	6.8	-	-	-	4.1	-
Critical Hdwy Stg 1	5.8	-	-	-	-	-
Critical Hdwy Stg 2	5.8	-	-	-	-	-
Follow-up Hdwy	3.5	-	-	-	2.2	-
Pot Cap-1 Maneuver	258	0	-	-	1080	-
Stage 1	587	0	-	-	-	-
Stage 2	600	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	232	-	-	-	1076	-
Mov Cap-2 Maneuver	232	-	-	-	-	-
Stage 1	585	-	-	-	-	-
Stage 2	543	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1076	-
HCM Lane V/C Ratio	-	-	-	0.059	-
HCM Control Delay (s)	-	-	0	8.6	0.3
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	233	149	0
Future Vol, veh/h	2	0	0	233	149	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	50	82	82	96	96
Heavy Vehicles, %	2	2	2	1	1	2
Mvmt Flow	4	0	0	284	155	0

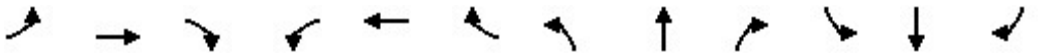
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	439	155	155	0	-	0
Stage 1	155	-	-	-	-	-
Stage 2	284	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	575	891	1425	-	-	-
Stage 1	873	-	-	-	-	-
Stage 2	764	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	575	891	1425	-	-	-
Mov Cap-2 Maneuver	575	-	-	-	-	-
Stage 1	873	-	-	-	-	-
Stage 2	764	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1425	-	575	-	-
HCM Lane V/C Ratio	-	-	0.007	-	-
HCM Control Delay (s)	0	-	11.3	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

APPENDIX F

2028 No Build Capacity/Level-of-Service Analysis



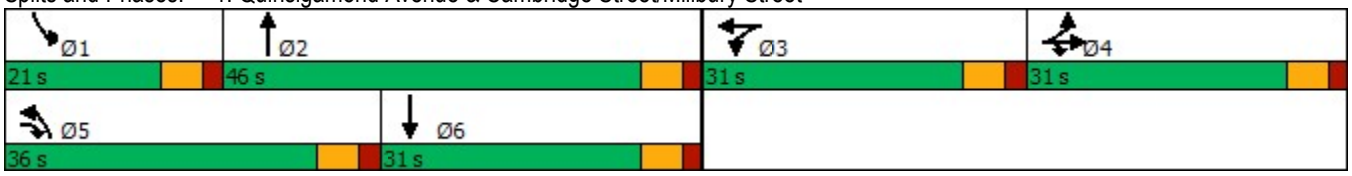
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	158	391	13	93	6	330	658	73	6	225	65
Future Volume (vph)	63	158	391	13	93	6	330	658	73	6	225	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1826	1583	0	1751	0	1770	3426	0	1805	3353	0
Flt Permitted		0.986			0.994		0.950			0.950		
Satd. Flow (perm)	0	1826	1583	0	1751	0	1770	3426	0	1805	3353	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			412		2			9			26	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.71	0.71	0.71	0.91	0.91	0.91	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	2%	2%	0%	7%	25%	2%	4%	2%	0%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	232	412	0	157	0	363	803	0	8	376	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		17.4	48.6		13.7		25.0	44.5		6.3	15.2	
Actuated g/C Ratio		0.18	0.50		0.14		0.26	0.46		0.07	0.16	
v/c Ratio		0.71	0.41		0.63		0.79	0.51		0.07	0.68	
Control Delay		51.8	2.9		53.3		49.1	21.2		53.2	44.4	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		51.8	2.9		53.3		49.1	21.2		53.2	44.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		D	A		D		D	C		D	D	
Approach Delay		20.5			53.3			29.9			44.6	
Approach LOS		C			D			C			D	
Queue Length 50th (ft)		137	0		93		207	166		5	111	
Queue Length 95th (ft)		255	51		140		#429	334		19	155	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		495	1074		476		576	1676		294	928	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.47	0.38		0.33		0.63	0.48		0.03	0.41	

Intersection Summary			
Area Type:	Other		
Cycle Length: 129			
Actuated Cycle Length: 96.3			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay: 31.3		Intersection LOS: C	
Intersection Capacity Utilization 60.0%		ICU Level of Service B	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	725	2	83	296
Future Vol, veh/h	0	0	725	2	83	296
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	96	96
Heavy Vehicles, %	2	2	4	0	3	4
Mvmt Flow	0	0	797	2	86	308

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1124	-	0	0	799	0
Stage 1	798	-	-	-	-	-
Stage 2	326	-	-	-	-	-
Critical Hdwy	6.84	-	-	-	4.16	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	-	-	-	2.23	-
Pot Cap-1 Maneuver	199	0	-	-	813	-
Stage 1	404	0	-	-	-	-
Stage 2	704	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	174	-	-	-	813	-
Mov Cap-2 Maneuver	174	-	-	-	-	-
Stage 1	404	-	-	-	-	-
Stage 2	614	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	2.5
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	813	-
HCM Lane V/C Ratio	-	-	-	0.106	-
HCM Control Delay (s)	-	-	0	10	0.4
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.4	-

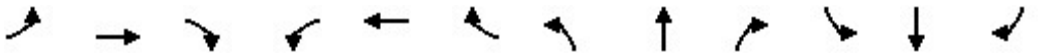
Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	1	2	0	237	110	0
Future Vol, veh/h	1	2	0	237	110	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	38	38	84	84	69	69
Heavy Vehicles, %	2	2	2	2	7	2
Mvmt Flow	3	5	0	282	159	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	441	159	159	0	-	0
Stage 1	159	-	-	-	-	-
Stage 2	282	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	574	886	1420	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	766	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	574	886	1420	-	-	-
Mov Cap-2 Maneuver	574	-	-	-	-	-
Stage 1	870	-	-	-	-	-
Stage 2	766	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.9	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1420	-	750	-	-
HCM Lane V/C Ratio	-	-	0.011	-	-
HCM Control Delay (s)	0	-	9.9	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-



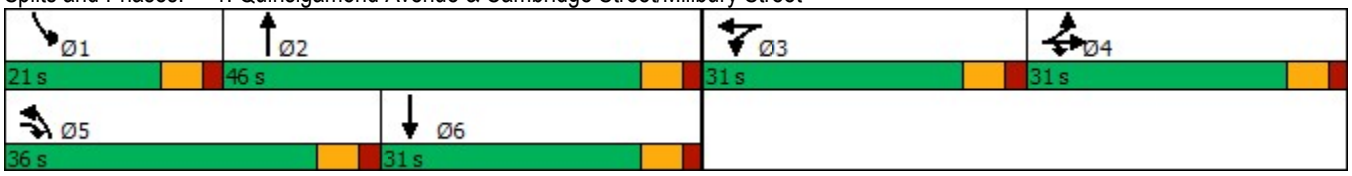
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	35	205	364	36	115	1	340	408	30	2	502	107
Future Volume (vph)	35	205	364	36	115	1	340	408	30	2	502	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1855	1599	0	1861	0	1770	3477	0	1805	3468	0
Flt Permitted		0.993			0.988		0.950			0.950		
Satd. Flow (perm)	0	1855	1599	0	1861	0	1770	3477	0	1805	3468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			404					6			17	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.90	0.90	0.90	0.96	0.96	0.96	0.92	0.92	0.92	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	2%	3%	0%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	267	404	0	159	0	370	476	0	2	717	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		20.1	53.0		14.0		26.8	56.1		6.1	25.4	
Actuated g/C Ratio		0.18	0.48		0.13		0.24	0.51		0.06	0.23	
v/c Ratio		0.79	0.41		0.68		0.86	0.27		0.02	0.89	
Control Delay		62.0	3.0		62.5		62.0	17.9		56.0	56.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		62.0	3.0		62.5		62.0	17.9		56.0	56.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A		E		E	B		E	E	
Approach Delay		26.5			62.5			37.2			56.1	
Approach LOS		C			E			D			E	
Queue Length 50th (ft)		189	0		115		258	96		1	271	
Queue Length 95th (ft)		301	52		191		#457	183		10	#397	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		425	1010		427		487	1767		248	809	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.63	0.40		0.37		0.76	0.27		0.01	0.89	

Intersection Summary

Area Type: Other
Cycle Length: 129
Actuated Cycle Length: 110.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.89
Intersection Signal Delay: 41.5 Intersection LOS: D
Intersection Capacity Utilization 77.0% ICU Level of Service D
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	436	8	56	611
Future Vol, veh/h	0	0	436	8	56	611
Conflicting Peds, #/hr	0	0	0	0	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	89	89	87	87
Heavy Vehicles, %	2	2	3	0	0	1
Mvmt Flow	0	0	490	9	64	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	978	-	0	0	503	0
Stage 1	499	-	-	-	-	-
Stage 2	479	-	-	-	-	-
Critical Hdwy	6.84	-	-	-	4.1	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	-	-	-	2.2	-
Pot Cap-1 Maneuver	248	0	-	-	1072	-
Stage 1	575	0	-	-	-	-
Stage 2	589	0	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	223	-	-	-	1068	-
Mov Cap-2 Maneuver	223	-	-	-	-	-
Stage 1	573	-	-	-	-	-
Stage 2	531	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	1.1
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	-	1068	-
HCM Lane V/C Ratio	-	-	-	0.06	-
HCM Control Delay (s)	-	-	0	8.6	0.4
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	0	0	237	152	0
Future Vol, veh/h	2	0	0	237	152	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	50	50	82	82	96	96
Heavy Vehicles, %	2	2	2	1	1	2
Mvmt Flow	4	0	0	289	158	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	447	158	158	0	-	0
Stage 1	158	-	-	-	-	-
Stage 2	289	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	569	887	1422	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	760	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	569	887	1422	-	-	-
Mov Cap-2 Maneuver	569	-	-	-	-	-
Stage 1	871	-	-	-	-	-
Stage 2	760	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.4	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1422	-	569	-	-
HCM Lane V/C Ratio	-	-	0.007	-	-
HCM Control Delay (s)	0	-	11.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0	-	0	-	-

APPENDIX G

2028 Build Capacity/Level-of-Service Analysis

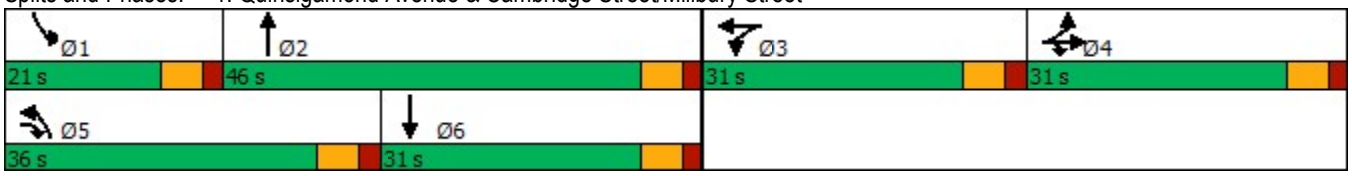
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	166	354	67	123	6	299	697	90	6	233	80
Future Volume (vph)	107	166	354	67	123	6	299	697	90	6	233	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1813	1583	0	1769	0	1770	3420	0	1805	3339	0
Flt Permitted		0.981			0.983		0.950			0.950		
Satd. Flow (perm)	0	1813	1583	0	1769	0	1770	3420	0	1805	3339	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			362		1			11			33	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.71	0.71	0.71	0.91	0.91	0.91	0.77	0.77	0.77
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	2%	2%	0%	7%	25%	2%	4%	2%	0%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	288	373	0	275	0	329	865	0	8	407	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		21.3	51.8		20.8		24.3	45.6		6.3	17.1	
Actuated g/C Ratio		0.20	0.48		0.19		0.22	0.42		0.06	0.16	
v/c Ratio		0.81	0.39		0.81		0.83	0.60		0.08	0.73	
Control Delay		62.3	3.5		63.3		60.5	27.4		58.7	50.0	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		62.3	3.5		63.3		60.5	27.4		58.7	50.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A		E		E	C		E	D	
Approach Delay		29.1			63.3			36.5			50.1	
Approach LOS		C			E			D			D	
Queue Length 50th (ft)		205	4		198		236	252		6	144	
Queue Length 95th (ft)		#370	58		240		#397	384		20	171	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		434	1023		424		509	1522		259	825	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.66	0.36		0.65		0.65	0.57		0.03	0.49	

Intersection Summary

Area Type: Other
Cycle Length: 129
Actuated Cycle Length: 108.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.83
Intersection Signal Delay: 39.7 Intersection LOS: D
Intersection Capacity Utilization 72.3% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	665	145	0	319
Future Vol, veh/h	0	0	665	145	0	319
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	77	77
Heavy Vehicles, %	2	2	4	2	2	4
Mvmt Flow	0	0	731	159	0	414

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1018	-	0	0	-	-
Stage 1	811	-	-	-	-	-
Stage 2	207	-	-	-	-	-
Critical Hdwy	6.84	-	-	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	-	-	-	-	-
Pot Cap-1 Maneuver	233	0	-	-	0	-
Stage 1	397	0	-	-	0	-
Stage 2	807	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	233	-	-	-	-	-
Mov Cap-2 Maneuver	233	-	-	-	-	-
Stage 1	397	-	-	-	-	-
Stage 2	807	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	68	665	0	0	319
Future Vol, veh/h	0	68	665	0	0	319
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	77	77
Heavy Vehicles, %	2	2	4	2	2	4
Mvmt Flow	0	74	731	0	0	414

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	366	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	631	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	631	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	631	-
HCM Lane V/C Ratio	-	0.117	-
HCM Control Delay (s)	-	11.5	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q(veh)	-	0.4	-

Intersection	
Int Delay, s/veh	3.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	48	12	731	2	123	271
Future Vol, veh/h	48	12	731	2	123	271
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	91	91	96	96
Heavy Vehicles, %	2	2	4	0	3	4
Mvmt Flow	52	13	803	2	128	282

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1201	403	0	0	805	0
Stage 1	804	-	-	-	-	-
Stage 2	397	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.16	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.23	-
Pot Cap-1 Maneuver	177	597	-	-	809	-
Stage 1	401	-	-	-	-	-
Stage 2	648	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	144	597	-	-	809	-
Mov Cap-2 Maneuver	144	-	-	-	-	-
Stage 1	401	-	-	-	-	-
Stage 2	526	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	38.8	0	3.6
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	170	809	-
HCM Lane V/C Ratio	-	-	0.384	0.158	-
HCM Control Delay (s)	-	-	38.8	10.3	0.5
HCM Lane LOS	-	-	E	B	A
HCM 95th %tile Q(veh)	-	-	1.7	0.6	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	78	47	6	3	57	18
Future Vol, veh/h	78	47	6	3	57	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	92	92	92	92
Heavy Vehicles, %	3	2	2	2	2	2
Mvmt Flow	111	67	7	3	62	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	178	0	162	145
Stage 1	-	-	-	-	145	-
Stage 2	-	-	-	-	17	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1398	-	829	902
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	1006	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1398	-	825	902
Mov Cap-2 Maneuver	-	-	-	-	825	-
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	1001	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.1	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	842	-	-	1398	-
HCM Lane V/C Ratio	0.097	-	-	0.005	-
HCM Control Delay (s)	9.7	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

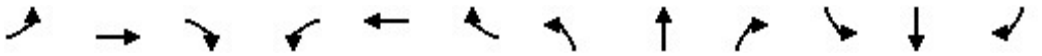
Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	18	96	47	215	100	9
Future Vol, veh/h	18	96	47	215	100	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	84	84	69	69
Heavy Vehicles, %	2	2	2	2	7	2
Mvmt Flow	20	104	56	256	145	13

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	520	152	158	0	-	0
Stage 1	152	-	-	-	-	-
Stage 2	368	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	516	894	1422	-	-	-
Stage 1	876	-	-	-	-	-
Stage 2	700	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	492	894	1422	-	-	-
Mov Cap-2 Maneuver	492	-	-	-	-	-
Stage 1	836	-	-	-	-	-
Stage 2	700	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1422	-	792	-	-
HCM Lane V/C Ratio	0.039	-	0.156	-	-
HCM Control Delay (s)	7.6	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.6	-	-



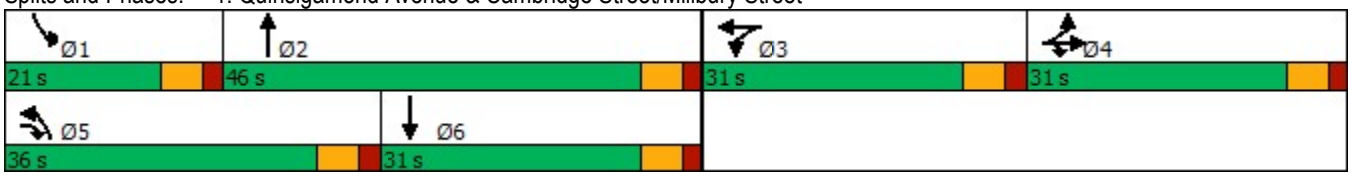
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	208	338	89	139	1	316	440	41	6	496	117
Future Volume (vph)	70	208	338	89	139	1	316	440	41	6	496	117
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	100		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	0	1850	1599	0	1851	0	1770	3468	0	1805	3456	0
Flt Permitted		0.988			0.981		0.950			0.950		
Satd. Flow (perm)	0	1850	1599	0	1851	0	1770	3468	0	1805	3456	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			304					8			20	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		306			346			320			326	
Travel Time (s)		7.0			7.9			7.3			7.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												1
Peak Hour Factor	0.90	0.90	0.90	0.96	0.96	0.96	0.92	0.92	0.92	0.85	0.85	0.85
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	2%	1%	0%	1%	0%	2%	3%	0%	0%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	309	376	0	239	0	343	523	0	7	722	0
Turn Type	Split	NA	pt+ov	Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4	4 5	3	3		5	2		1	6	
Permitted Phases												
Detector Phase	4	4	4 5	3	3		5	2		1	6	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		6.0	5.0		6.0	5.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		12.0	11.0		12.0	11.0	
Total Split (s)	31.0	31.0		31.0	31.0		36.0	46.0		21.0	31.0	
Total Split (%)	24.0%	24.0%		24.0%	24.0%		27.9%	35.7%		16.3%	24.0%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	Min		None	Min	
Act Effct Green (s)		22.6	54.5		19.0		25.8	55.1		6.1	25.4	
Actuated g/C Ratio		0.19	0.47		0.16		0.22	0.47		0.05	0.22	
v/c Ratio		0.87	0.42		0.80		0.88	0.32		0.07	0.95	
Control Delay		71.1	5.8		67.8		69.1	21.5		60.0	67.5	
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay		71.1	5.8		67.8		69.1	21.5		60.0	67.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		E	A		E		E	C		E	E	
Approach Delay		35.3			67.8			40.3			67.4	
Approach LOS		D			E			D			E	
Queue Length 50th (ft)		237	30		185		261	126		5	~301	
Queue Length 95th (ft)		#411	98		279		#431	214		21	#423	
Internal Link Dist (ft)		226			266			240			246	
Turn Bay Length (ft)										100		
Base Capacity (vph)		400	948		400		459	1633		234	763	
Starvation Cap Reductn		0	0		0		0	0		0	0	
Spillback Cap Reductn		0	0		0		0	0		0	0	
Storage Cap Reductn		0	0		0		0	0		0	0	
Reduced v/c Ratio		0.77	0.40		0.60		0.75	0.32		0.03	0.95	

Intersection Summary

Area Type: Other
Cycle Length: 129
Actuated Cycle Length: 117.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.95
Intersection Signal Delay: 49.4 Intersection LOS: D
Intersection Capacity Utilization 82.1% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Quinsigamond Avenue & Cambridge Street/Millbury Street



Intersection	
Int Delay, s/veh	0

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	0	416	95	0	619
Future Vol, veh/h	0	0	416	95	0	619
Conflicting Peds, #/hr	0	0	0	3	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	83	83	85	85
Heavy Vehicles, %	2	2	3	2	2	1
Mvmt Flow	0	0	501	114	0	728

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	925	-	0	0	-	-
Stage 1	561	-	-	-	-	-
Stage 2	364	-	-	-	-	-
Critical Hdwy	6.84	-	-	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	-	-	-	-	-
Pot Cap-1 Maneuver	268	0	-	-	0	-
Stage 1	535	0	-	-	0	-
Stage 2	673	0	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	267	-	-	-	-	-
Mov Cap-2 Maneuver	267	-	-	-	-	-
Stage 1	533	-	-	-	-	-
Stage 2	673	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	0	-
HCM Lane LOS	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	36	416	0	0	619
Future Vol, veh/h	0	36	416	0	0	619
Conflicting Peds, #/hr	0	0	0	3	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	83	83	85	85
Heavy Vehicles, %	2	2	3	2	2	1
Mvmt Flow	0	39	501	0	0	728

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	251	0	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.94	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.32	-	-	-	-
Pot Cap-1 Maneuver	0	749	-	0	0	-
Stage 1	0	-	-	0	0	-
Stage 2	0	-	-	0	0	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	-	749	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.1	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	SBT
Capacity (veh/h)	-	749	-
HCM Lane V/C Ratio	-	0.052	-
HCM Control Delay (s)	-	10.1	-
HCM Lane LOS	-	B	-
HCM 95th %tile Q(veh)	-	0.2	-

Intersection	
Int Delay, s/veh	2.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	6	444	8	103	576
Future Vol, veh/h	43	6	444	8	103	576
Conflicting Peds, #/hr	0	0	0	0	4	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	89	89	87	87
Heavy Vehicles, %	2	2	3	0	0	1
Mvmt Flow	47	7	499	9	118	662

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1075	258	0	0	512	0
Stage 1	508	-	-	-	-	-
Stage 2	567	-	-	-	-	-
Critical Hdwy	6.84	6.94	-	-	4.1	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	-	-	2.2	-
Pot Cap-1 Maneuver	214	741	-	-	1064	-
Stage 1	569	-	-	-	-	-
Stage 2	531	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	176	738	-	-	1060	-
Mov Cap-2 Maneuver	176	-	-	-	-	-
Stage 1	567	-	-	-	-	-
Stage 2	438	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30.4	0	1.8
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	194	1060	-
HCM Lane V/C Ratio	-	-	0.275	0.112	-
HCM Control Delay (s)	-	-	30.4	8.8	0.6
HCM Lane LOS	-	-	D	A	A
HCM 95th %tile Q(veh)	-	-	1.1	0.4	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	60	51	5	3	46	12
Future Vol, veh/h	60	51	5	3	46	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	92	92	92	92
Heavy Vehicles, %	0	2	2	2	2	2
Mvmt Flow	72	61	5	3	50	13

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	133	0	116	103
Stage 1	-	-	-	-	103	-
Stage 2	-	-	-	-	13	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1452	-	880	952
Stage 1	-	-	-	-	921	-
Stage 2	-	-	-	-	1010	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1452	-	877	952
Mov Cap-2 Maneuver	-	-	-	-	877	-
Stage 1	-	-	-	-	921	-
Stage 2	-	-	-	-	1007	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.7	9.3
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	892	-	-	1452	-
HCM Lane V/C Ratio	0.071	-	-	0.004	-
HCM Control Delay (s)	9.3	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	15	88	35	220	141	9
Future Vol, veh/h	15	88	35	220	141	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	82	82	96	96
Heavy Vehicles, %	2	2	2	1	1	2
Mvmt Flow	16	96	43	268	147	9

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	506	152	156	0	-	0
Stage 1	152	-	-	-	-	-
Stage 2	354	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	526	894	1424	-	-	-
Stage 1	876	-	-	-	-	-
Stage 2	710	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	508	894	1424	-	-	-
Mov Cap-2 Maneuver	508	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	710	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.2	1	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1424	-	805	-	-
HCM Lane V/C Ratio	0.03	-	0.139	-	-
HCM Control Delay (s)	7.6	0	10.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.5	-	-

APPENDIX H

Capacity/Level-of-Service Analysis Summary

CAPACITY ANALYSIS SUMMARY

Weekday Morning Peak Hour
Convenience Store & Gas Station
Worcester, MA

			2021 Existing			2028 No Build			2028 Build		
Intersection	**Movement**		**LOS[1]**	**Delay[2]**	**V/C[3]**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**	**V/C**
Quinsigamond Avenue at	EB	LT	D	50.7	0.70	D	51.8	0.71	E	62.3	0.81
Cambridge Street/Millbury Street		R	A	2.8	0.41	A	2.9	0.41	A	3.5	0.39
	WB	LTR	D	52.4	0.62	D	53.3	0.63	E	63.3	0.81
	NB	L	D	48.5	0.79	D	49.1	0.79	E	60.5	0.83
		TR	C	21.0	0.50	C	21.2	0.51	C	27.4	0.60
	SB	L	D	52.7	0.07	D	53.2	0.07	E	58.7	0.08
		TR	D	43.7	0.68	D	44.4	0.68	D	50.0	0.73
	Overall		*C*	*30.8*	*0.59*	*C*	*31.3*	*0.60*	*D*	*39.7*	*0.72*
Quinsigamond Avenue at	NB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
South Site Driveway	SB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Quinsigamond Avenue at	WB	R	n/a	n/a	n/a	n/a	n/a	n/a	B	11.5	0.12
North Site Driveway	NB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
	SB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Quinsigamond Avenue at	WB	LR	n/a	n/a	n/a	n/a	n/a	n/a	E	38.8	0.38
Arwick Avenue	NB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
	SB	LT	A	2.5	0.10	A	2.5	0.11	A	3.6	0.16
Arwick Avenue at	EB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	n/a	A	5.1	0.01
	NB	LR	n/a	n/a	n/a	n/a	n/a	n/a	A	9.7	0.10
Millbury Street at	EB	LR	A	9.8	0.01	A	9.9	0.01	B	10.4	0.16
Site Driveway	NB	LT	A	0.0	0.00	A	0.0	0.00	A	1.4	0.04
	SB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00

1 Level-of-Service

2 Average vehicle delay in seconds

3 Volume to capacity ratio; intersection capacity utilization reported for overall values

n/a Not applicable

QUEUES SUMMARY

Weekday Morning Peak Hour
Convenience Store & Gas Station
Worcester, MA

			2021 Existing		2028 No Build		2028 Build	
Intersection	**Movement**		**50th Q[1]**	**95th Q[2]**	**50th Q**	**95th Q**	**50th Q**	**95th Q**
Quinsigamond Avenue at	EB	LT	132	249	137	255	205	370
Cambridge Street/Millbury Street		R	0	50	0	51	4	58
	WB	LTR	89	137	93	140	198	240
	NB	L	199	413	207	429	236	397
		TR	161	326	166	334	252	384
	SB	L	5	19	5	19	6	20
		TR	106	152	111	155	144	171
Quinsigamond Avenue at	NB	TR	n/a	n/a	n/a	n/a	n/a	0
South Site Driveway	SB	T	n/a	n/a	n/a	n/a	n/a	0
Quinsigamond Avenue at	WB	R	n/a	n/a	n/a	n/a	n/a	10
North Site Driveway	NB	T	n/a	n/a	n/a	n/a	n/a	0
	SB	T	n/a	n/a	n/a	n/a	n/a	0
Quinsigamond Avenue at	WB	LR	n/a	0	n/a	0	n/a	43
Arwick Avenue	NB	TR	n/a	0	n/a	0	n/a	0
	SB	TR	n/a	8	n/a	10	n/a	15
Arwick Avenue at	EB	TR	n/a	n/a	n/a	n/a	n/a	0
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	0
	NB	LR	n/a	n/a	n/a	n/a	n/a	8
Millbury Street at	EB	LR	n/a	0	n/a	0	n/a	15
Site Driveway	NB	LT	n/a	0	n/a	0	n/a	3
	SB	TR	n/a	0	n/a	0	n/a	0

1 50th percentile queue in feet

2 95th percentile queue in feet

n/a Not applicable

CAPACITY ANALYSIS SUMMARY

Weekday Afternoon Peak Hour
Convenience Store & Gas Station
Worcester, MA

			2021 Existing			2028 No Build			2028 Build		
Intersection	**Movement**		**LOS[1]**	**Delay[2]**	**V/C[3]**	**LOS**	**Delay**	**V/C**	**LOS**	**Delay**	**V/C**
Quinsigamond Avenue at	EB	LT	E	61.1	0.78	E	62.0	0.79	E	71.1	0.87
Cambridge Street/Millbury Street		R	A	3.0	0.41	A	3.0	0.41	A	5.8	0.42
	WB	LTR	E	61.8	0.67	E	62.5	0.68	E	67.8	0.80
	NB	L	E	60.7	0.85	E	62.0	0.86	E	69.1	0.88
		TR	B	17.6	0.26	B	17.9	0.27	C	21.5	0.32
	SB	L	E	56.0	0.02	E	56.0	0.02	E	60.0	0.07
		TR	D	53.3	0.86	E	56.1	0.89	E	67.5	0.95
	Overall		*D*	*40.2*	*0.76*	*D*	*41.5*	*0.77*	*D*	*49.4*	*0.82*
Quinsigamond Avenue at	NB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
South Site Driveway	SB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Quinsigamond Avenue at	WB	R	n/a	n/a	n/a	n/a	n/a	n/a	B	10.1	0.05
North Site Driveway	NB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
	SB	T	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Quinsigamond Avenue at	WB	LR	n/a	n/a	n/a	n/a	n/a	n/a	D	30.4	0.28
Arwick Avenue	NB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00
	SB	LT	A	1.0	0.06	A	1.1	0.06	A	1.8	0.11
Arwick Avenue at	EB	TR	n/a	n/a	n/a	n/a	n/a	n/a	A	0.0	0.00
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	n/a	A	4.7	0.00
	NB	LR	n/a	n/a	n/a	n/a	n/a	n/a	A	9.3	0.07
Millbury Street at	EB	LR	B	11.3	0.01	B	11.4	0.01	B	10.2	0.14
Site Driveway	NB	LT	A	0.0	0.00	A	0.0	0.00	A	1.0	0.03
	SB	TR	A	0.0	0.00	A	0.0	0.00	A	0.0	0.00

1 Level-of-Service

2 Average vehicle delay in seconds

3 Volume to capacity ratio; intersection capacity utilization reported for overall values

n/a Not applicable

QUEUES SUMMARY

Weekday Afternoon Peak Hour
Convenience Store & Gas Station
Worcester, MA

			2021 Existing		2028 No Build		2028 Build	
Intersection	**Movement**		**50th Q[1]**	**95th Q[2]**	**50th Q**	**95th Q**	**50th Q**	**95th Q**
Quinsigamond Avenue at	EB	LT	184	294	189	301	237	411
Cambridge Street/Millbury Street		R	0	52	0	52	30	98
	WB	LTR	111	187	115	191	185	279
	NB	L	249	442	258	457	261	431
		TR	92	178	96	183	126	214
	SB	L	1	10	1	10	5	21
		TR	262	383	271	397	301	423
Quinsigamond Avenue at	NB	TR	n/a	n/a	n/a	n/a	n/a	0
South Site Driveway	SB	T	n/a	n/a	n/a	n/a	n/a	0
Quinsigamond Avenue at	WB	R	n/a	n/a	n/a	n/a	n/a	5
North Site Driveway	NB	T	n/a	n/a	n/a	n/a	n/a	0
	SB	T	n/a	n/a	n/a	n/a	n/a	0
Quinsigamond Avenue at	WB	LR	n/a	0	n/a	0	n/a	28
Arwick Avenue	NB	TR	n/a	0	n/a	0	n/a	0
	SB	TR	n/a	5	n/a	5	n/a	10
Arwick Avenue at	EB	TR	n/a	n/a	n/a	n/a	n/a	0
Site Driveway	WB	LT	n/a	n/a	n/a	n/a	n/a	0
	NB	LR	n/a	n/a	n/a	n/a	n/a	5
Millbury Street at	EB	LR	n/a	0	n/a	0	n/a	13
Site Driveway	NB	LT	n/a	0	n/a	0	n/a	3
	SB	TR	n/a	0	n/a	0	n/a	0

1 50th percentile queue in feet

2 95th percentile queue in feet

n/a Not applicable